ELECTRICAL REVIEW

[ILLUSTRATED.]

A WEEKLY JOURNAL OF

ELECTRIC LIGHT, TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

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More Light in Detroit.

The National Electric Light Association Holds Its Fourth Convention.

An Excellent Programme Commenced and an Interesting Session Anticipated.

[Special to the ELECTRICAL REVIEW.]

DETROIT, Mich., Aug. 31.

For two days past delegates and visitors have been arriving in the city, and registering at the Russell House, which was selected as the most desirable headquarters for the Association. The arrivals include a number of new faces, the great and growing West being largely represented. Nearly all of the faithful workers from the East are here, enthusiastic and earnest as ever. The beauty of the city of Straits is commented on by all, and the tower system of electric lighting is to be seen here in all its expanding and refulgent glory. This system of lighting certainly adds to the attractiveness of the city, and it is well lighted. The Brush Company does the lighting.

Arrangements were made by Mr. W. H. Fitzgerald for the comfort and convenience of the visitors. In the hotel no appropriate room for the sessions could be secured, and these are being held in the Council Chamber in the City Hall, just across the street. The members of the REVIEW staff are under particular obligations to Mr. W. H. McKinlock, who had secured first-class accommodations for them.

A talk with the delegates this forenoon proved to your correspondent that the interest in this Association is increasing. Notwithstanding the fact that this is the busy season for all electric lighting companies, and September the most difficult month for the principals to be absent, the attendance is large and many others are on the way who will arrive this afternoon and evening. Among those present from the East are :

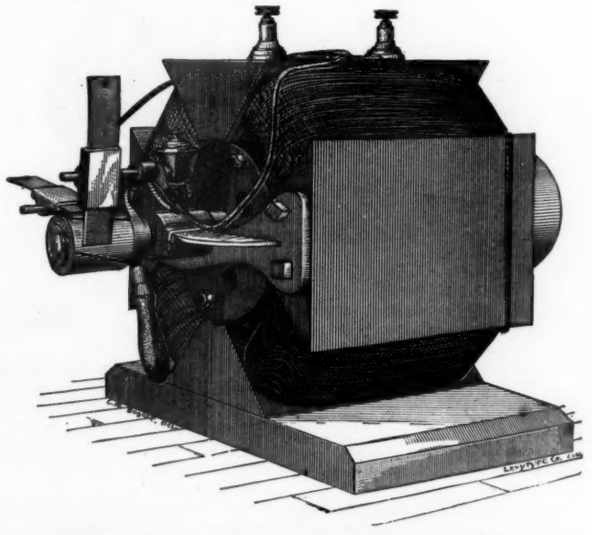
F. A Gilbert and James English, of New Haven ; H. D. Stanley, Bridgeport ; A. V. Garratt, Frank Ridlon, M. M. M. Slattery, Fred. Swift, A. F. Upton, E. D. Libbey, Boston ; R.T. Robinson, Providence ; A.W. McCausland, Henry Hine, Geo. L. Beetle, Geo. Manson, J L. Barclay, R. W. Ryan, Clark B. Hotchkiss, F. W. Harrington, H. N. Reed, New York ; Chas. Cooper, Brooklyn ; Geo. F. Porter, Geo. Boyer, Stephen Holbrooke, S. B. Richards, A. J. DeCamp, Philadelphia ; J. F. Noonan, Paterson, N. J. From the South Baltimore sends quite a delegation, including Arthur Stewart, Secretary McCoubrey, and a number of others. Pittsburgh, Cleveland and Cincinnati are all represented From Chicago there are C. C. Haskins, C. A. Brown, John Young, C. C. Cotter, Geo. S. Bowen ; from Kansas City, Vice-President Weeks is the only representative as yet ; J. A. J. Shultz, Messrs. Parker and Russell, of St. Louis, are here ; J. A. Corby, of St. Joe, and T. M. King, of Minneapolis also. These names, hur-

(*Continued on fifth page.*)

The Silvey Electric Light and Motor Co.

Readers of this journal will remember mention of Mr. W. L. Silvey that appeared several months ago, to the effect that this young Cincinnati electrician, after experimenting quite extensively in the electric field, more particularly with induction, had turned his attention to electric lighting. The dynamo which he has constructed and which a Cincinnati company has been organized to exploit, is shown on this page. The company's president is Mr. P. P. Lane, who is also president of the widely known Lane & Bodley Engine Company; secretary and treasurer, Mr. John E. Bell; electrician and superintendent, W. L. Silvey. The company's offices are No. 161 Main street, Cincinnati.

A number of claims are made for this new dynamo which certainly has a very compact,



THE SILVEY DYNAMO, MANUFACTURED IN CINCINNATI, OHIO.

carefully-constructed appearance. The armature is, as will be noticed, entirely enclosed within the field, giving a large working surface in a small space. The light produced is steady and brilliant. The inventor is particularly proud of the economy he has been able to secure in the operation of this machine, and is also confident that it will produce more light in proportion to its size than any at present on the market. The Silvey Company will manufacture a complete system of arc and incandescent lights.

Prof. Siemens on Insulation of Underground Wires.

"It will appear wonderful to many," says Herr Siemens, "that jute is employed as an insulating material, and this is frequently ascribed to economical grounds only, but such is not the case. It is known that Sir W. Thomson has found that the plant fibres themselves are a perfect insulator. This induced us to employ this plant fiber for cables, whilst we made use of a special preparation to insure perfect freedom from damp. But the insulation would not be completely attained if the pores of the jute were not filled after the drying with some substance which is rendered liquid by heat, is a good insulator, and besides is not hygroscopic. It was already known to physicists that caoutchouc oil, obtained by the distillation of caoutchouc, possesses these properties in a high degree. It is a matter of essential importance to fill the pores of the dried insulating layer, and at the same time to make the lead case perfectly compact, which serves to cut off the damp of the ground. The lead pipe is now almost perfect. With under ground telephone cables there are two evils to be combated, namely, electrostatic induction and electro-magnetic induction. The action of both phenomena is to give rise to disturbances in neighboring wires. The first kind of disturbance may be avoided by surrounding each wire by a conducting coat. This, however, does not entirely ward off the electro-magnetic induction, which can only be obviated by the simultaneous action of currents of opposite direction. To get rid as far as possible of the electro-magnetic induction, we must either use double wires twisted so as to often change their position relative to one another, or an investing coat of good conductivity in order that compensating currents of opposite direc ion may be called fortb. This is carried into effect by means of a closed copper sheath, which wards off the effect of static induction, and to a great extent that of the magnetic, too. Alas, this also occasions a weakening of the currents; consequently, also of the sound in the telephone. This can, however, never be avoided, since it depends on unalterable natural laws."

—— Forty arc lights of the United States Illuminating Company were in use all during the day one day last week at the People's Theater in New York. This brilliant light was made use of in getting photographs of scenes in the new Russian play of "Zitka."

WIRE JOINTS.

BY C. C. HASKINS, CITY INSPECTOR OF ELECTRIC LIGHTS, CHICAGO, ILL., CONSULTING ELECTRICIAN AND CORRESPONDENT OF THE "ELECTRICAL REVIEW."

READ BEFORE THE ELECTRIC LIGHT CONVENTION AT DETROIT, MICH., AUG. 31, 1886.

Joints, splices, connections, by whatever name we may designate them, play an important part in all vehicles of electricity. From that conductor which carries the pigmy talking current of the telephone, or that other feeble weakling, which from the manager's desk rings up the nodding office boy, on the one hand, to the carrier of a giant power which lights a thoroughfare, or, successfully combating the forces of nature, attracts the metal and repels the dross in a valuable ore.

The influences which one of these junctions may exert for good or for evil is varied by an element in the question liable to be overlooked by a casual observer. A connection which will answer all necessary demands, in a burglar alarm wire or a call bell circuit, the simplest of all connections a bell-hanger's joint, might be an element of untold annoyance and loss if placed in the path of another form of current. In telephone work, too, an imperfect joint, provided it is not loose enough to set up a microphonic action, is usually considered a matter of comparatively small importance provided the subscriber pays his bills promptly.

In both these cases the original outlay for mechanical power is so slight, the weight of copper so small, the entire combination so simple, that a renewal of the plant would be hardly more than the re-insulation of an ordinary central electric light plant, and hence of little consequence.

The average electric light man is a graduate of some one of the schools alluded to above. He comes, usually, from either the telephone or the telegraph department of electricity, and naturally brings with him the ways and ideas which pertain and belong to those enterprises. The unlearning, the forgetting of certain of these ways and ideas, the re-teaching of such employes is really a matter of more labor and less progress than if the scholar were one who had never been a toiler in any electrical field.

The telephone man will tell how many hundreds of joints he has made without even scraping the wire, and that all the connections on the switchboard where he learned the business were fastened without soldering, and "no lines ever worked better than they did in the old N. G. exchange."

And the telegraph man boasts of the thousands of joints he has made where he twisted a number nine wire so tight that years afterward, when Doran, or Bristol, or Pat Whalen, renewed the line, in each of his joints that was opened out they found the line of contact between the two wires as bright as the day it was put there—perhaps before the war. It is hard teaching old dogs new tricks. The telegraph people have an advantage over the electric light people in this: their lines are all run in a way to enable an electrician, seated at some telegraph center like Chicago, New York, New Orleans,

or San Francisco, to connect with any one of these which is working unsatisfactorily, study its symptoms and prescribe for the disease, no matter how far away. An expert at the terminal of the cable connecting two continents will measure the distance to a fault in the line, and locate it so nearly that it is picked up with little difficulty. In a telegraph line an amount of resistance equivalent to that of one relay in the line would be readily compensated for by a slight increase of battery power, or still more easily by the adjustment of the instruments in the line—such an addition to the resistance of an electric light circuit might be almost equivalent to shutting down the plant.

On the other hand a current which the telegraph service requires would be effectually stopped by a resistance to which a dynamo current would pay little heed. Experience shows that a bad joint is more readily found by using a small battery than a large one. Such a joint on a line having, for example, 25 cells of battery will occasionally open the line and thus cause annoyance, while for the most part of the time the line will remain closed. Now, if while it is open the 25 cell battery be short circuited with a 30 ohm relay in circuit, when the battery is again opened out suddenly the line will close through the imperfect joint.

Several explanations of this peculiar phenomenon have been suggested. It has been claimed that a mechanical closing of the fault is produced by the metallic expansion due to heat. Another suggestion was that the two electrical conditions either side the break being opposite in character and mutually attracted toward each other, these acted magnetically and closed the gap by attraction.

In all this matter of insulation and conductivity we must bear in mind that these terms are only relative; and that while a moderately low insulator answers every purpose for a battery current, the magneto current will overstep the obstruction; and when we have increased the insulation till this will no longer permit the passage of this force of higher potential, we have only to discharge the spark from a Holtz or other frictional machine to see that what was but just now an insulator has become a conductor. This spark will go readily through a silk hat, or the sole of a dry boot. Taking an extreme, what are we to think of the insulation resistance of a layer of dry air, a mile or more in thickness, through which a thunder bolt descends from clouds to earth? It may be claimed that the water drops in a storm serve as stepping stones for the current in this case; but it must not be forgotten that the same condition of affairs does not exist in a snow storm, nor in many instances where heavy discharges of lightning occur previous to a summer shower.

One thing more in this line of digression. A joint having more than the normal resistance of the line—like any portion of the wire which is too small—will always show heat in proportion to such obstruction.

The only instrument known to the average electric light man, for any form of testing is the magneto bell, the introduction of which into this service for such purposes I look upon as a most lamentable mistake, in that it is incompetent for good, while it is abundantly powerful for mischief by misleading those who rely upon it. But for the existence of this imbecile machine I feel certain that long ere this the inventive genius of electrical scientists would have given to all a cheap, comprehensive combination, capable of making all the tests for any form of electrical plant. As it is, its application to a line can only give one of two answers. The bell rings or it does not. If it rings and the circuit through which the current flows is short, why it rings! If the circuit is a long one it may ring when there is an actual insulation of thousands of megohms, and possibly ring louder than if there was a leak, I know of no practical way by which the amount of leak can be ascertained by the use of a magneto bell.

The old saw about the danger of a small amount of learning is sometimes applicable to the employe in charge of an electric light plant, however good his intentions are, however ready he may be to learn. There are certain acts which he performs which naturally lead up to certain results, he does not always know, and often does not care why. Like the fireman in the gas works who said, "I don't know nothing about your hydrogin nor your oxogin, nor your nitrogin, but I knows when I puts coal under the retorts the holder goes up." Feeling too, as he does, that all the knowledge he has acquired has been through his own unaided efforts and ability he quite naturally bottles up his experience and allows his successor to accumulate a fund of information for personal use in his own way.

Since my attention was first drawn to electric light circuits, I have had almost no end of controversies with these my co-laborers many of whose names I have seen catalogued in popular lists as electricians—men who talk familiarly of "computators" and "low currents," "induction," and the old fogy idea of using "sodder" in joints. These disputations have not always resulted in conviction, but when I have succeeded by stubbornness in convincing my learned peers, something like a "before and after taking" picture has usually proved the best argument.

During the first six months of my experience as inspector, I visited a plant and made the acquaintance of the electrician in charge, who informed me, with a deal of satisfaction, that he "knew all about electricity." This knowledge he had acquired in a year and a-half, while in charge of a plant of 26 lights. It goes without saying that he had invented a complete system of electric lighting, which was soon to astonish the world.

His ability was demonstrated by the condition of his circuit. In this were ten or a dozen wire joints, none of which had ever been soldered, and all were more or less loose. One near the dynamo was so imperfect that the two loops of which it was made rattled like the links of a chain. The circuit had three sizes of wire, and in several places was fastened to the woodwork with iron staples.

The changes which I deemed necessary were the cause of much discomfort to the proprietor of the plant, who had great faith in his "electrician," and the inspection fee was grudgingly paid.

In less than a week I heard from the owner of the plant. He said that the saving in coal would pay all the expenses in two or three months, and that they were getting better light with a much slower running dynamo.

A still more striking illustration of the necessity of good joints is part of my experience. In this case, a central plant having been in operation some two or three years had gradually deteriorated until less than half the guaranteed number of lights could be burned on the circuit, and these were not up to the normal light standard.

It was one of those plants that was constantly undergoing changes. Lamps discontinued at one point were cut in at another, to suit the whims or necessities of consumers, until the entire three miles of wire was but little better than a scrap-heap line.

From that three miles of wire over 100 connections, good, bad and indifferent, were overhauled, inspected, renewed where necessary.

How the dynamo had been able to maintain as many lights as it did was a mystery. The entire circuit cold measured over 300 ohms. The line, after the necessary changes were made, came back to its normal condition, and is to-day performing its proper functions.

There are two requisites in a wire splice which I hold are are too frequently ignored. A badly shaped joint is exceedingly difficult to properly insulate, and an uninsulated joint, in some cases, may be an element of extreme discomfort both to patience and to pocket when the inevitable electrolysis gets a foothold through the intervention of moisture, and oxidation sets up abnormal resistance. A joint, then, should be not only perfect as to connection but perfect as to insulation.

The greater portion of the joints in the case mentioned a moment ago were of that class of abominations known to all of us as connectors—a brass sleeve to receive the wires and a couple of iron screws to hold these in place.

Prof. Eaton's New Volt-Am-Meter.

In this combination we have the metallic elements necessary for a local battery—small, it is true, but abundantly capable for mischief. And with every heavy dew, with every fall of rain, we have the necessary fluid to set our battery in action.

This form of joint is usually left uncovered, to render it handy for testing or cutting in loops. Electrolytic action introduces an oxide, which coats the inside of the loose-fitting sleeve until the total carrying capacity of the joint is the contact between the iron screws and the wire, with an occasional touching in the sleeve, provided the screws are driven home with a force capable of twisting off their heads. Otherwise, where these have worked loose, an arc has sometimes been established, melting off the conductor, and waking up a fire department.

Now, let us look at the condition of affairs on such a circuit. Suppose the capacity of the plant is twenty lights. To insure good work, a wire equivalent to a No. 6 American gauge is necessary. Reduction in the carrying capacity of a joint is equivalent to the introduction of a smaller wire in the circuit, which means reduction in the current, reduced illuminating power, more coal, and an average increased amount of profanity from lamp trimmer to proprietor, and dissatisfaction on the part of the consumer.

For the flow of current is the quotient of the electromotive force of the generator divided by the resistance of the circuit, and the greater the divisor the smaller will be the quotient. One bad joint in a line may offer more obstruction to the passage of a current than all the lamps on the circuit put together.

Such an amount of resistance on a telegraph or a telephone line, however, would be a matter of very minor importance.

It is sometimes easier to diagnose a case than to prescribe for its cure. I have stated that I consider it essential that there should be abundant carrying capacity in a joint, and that this should be protected by an insulating covering.

The first consideration is satisfied by any form of joint which is soldered, but the presence of a second metal, a brass or iron connector for a copper wire, or a copper or brass connector for an iron wire—these become battery elements in this combination, and dampness from whatever cause is ever ready to complete and set the battery to working.

The American telegraph twist joint, closely and firmly made; the Britannia joint, in which the two wires, turned at the ends to prevent slipping, are bound together with a third, smaller wire; the scarfed joint, the parallel copper tubes which receive the wire ends and are then twisted; and the copper sleeve, which is provided with openings through which to solder the wire—all these are good, when soldered, to fulfill the first requirement of a complete joint; and the one of all these which permits of the most thorough insulation by wrapping, combined with sufficient strength, is the most perfect joint.

On the other hand, the most perplexing joint, and one which has given our electric light people the greatest annoyance, is that which serves as the junction of the overhead and underground wires, where the latter is covered with lead and the former is of the underwriter or painted wire variety.

The ease with which one of these joints will absorb moisture, and bridge over from the underwriter wire to the grounded metal covering of the underground line, and so drop the insulation resistance below a safe point, or aided by a second ground elsewhere, set up an arc and a row among the fire worshippers at the same time, is both provoking and astonishing.

There seems to be a deal of satisfaction in a quiet way to a bit of spun fabric, when it can find a trifle of moisture somewhere and carry this to where it is not wanted by capillary attraction, and thus set at naught all but the most carefully-prepared underground joint work.

The simplest and most thorough remedy for this trouble is to carry the underground wire far enough above the soil to escape the moisture before joining up to the other wire The objection to this is the cost of the additional cable or underground wire.

My best success in defeating the wiles of the enemy in such cases has been achieved through the use of asphaltum. I claim nothing new for my method, unless it be in the quantity used. I first bare the wire several inches either side of the joint. After the splice is complete and cleaned of all moisture, acid, etc., I paint the naked wire with hot asphaltum, up to and beyond the insulation on the white wire, and beyond where I intend wrapping on the lead. After two or three coats, I alternately wrap and paint, thoroughly insulating each wrap from the next, until the whole is well covered. In no case would I permit the wrapping to touch the lead or the white wire beyond the painted portion.

If this is done faithfully, there will be no connection between the lead on the one side and the white wire on the other, by which moisture will travel across, and if the joint is finally left in such a position that moisture, accumulating on the lead by condensation, will have to run up hill to reach the joint, and the line is kept clear of ground leaks, there will be, I fancy, little annoyance at that part of the line.

There is a traditional belief, as widespread as it is erroneous, that tape well rubbed down will stick forever. What pity this were not the fact. The oily constituents of the insulation soon evaporate, and the tape peels off. A couple of inches of small wire will hold the last end of a piece of tap-

ing, if carried once round, and the ends are twisted together.

There is sometimes a fruitful source of trouble through imperfect contact at the lamp binding post. An imperfect contact, a loose screw, may result in an arc and serious injury to the lamp at that point.

The constant vibration of the wire there tends to loosen the binding screw, and, of course, to encourage trouble. Any form of hanger which shortens the loop of wire leading out to the lamp reduces the amount of this vibration, and lessens the possibility of trouble at the binding post. This loop may be successfully done away with on either permanent lamp or those which of necessity must be lowered and raised, and experience has shown in Chicago that hangers which accomplish the results are far better and safer than the old form, not only on account of lessening the danger of a bad connection at the binding post, but on account of other good results, which do not properly belong to the branch of electric lighting now under discussion.

Probably the very worst joints on a plant, all things considered, are those sometimes found in the dynamo room. Here, under the eye, and within reach of every employe of the company, the wires bear a certain resemblance to a lot of last year's spider webs, or the abandoned drying room of a country laundry.

Call the attention of the party in charge to this condition of the wires and connections, and he invariably tells you that these are only temporary, though the dust of months has accumulated upon the joints, the wrappings, where there are any, are flying in the air like piratical signals of distress, or hanging like a rag on a sore toe, and the wires are covered with black particles that tell of age and neglect. When I see one of these temporarily wired dynamo rooms I dread to attack the circuit, for I feel quite sure I have an up-hill task before me. It is usually an index to the condition of affairs all along the line. Such a dynamo room is in excellent keeping with a line filled with bad joints, ragged insulation, poorly-attended lamps, dissatisfied consumers and unhappy stock holders. On the other hand, when I find the dynamo, wires, and connections in proper form in the dynamo room, I feel that I shall at least be seconded in my efforts at reform, and usually I am not mistaken.

Facts are usually capable of being borne out by figures. While the wires used in electric light work are, perhaps, less liable to become affected by imperfect connections a comparatively lower resistance may result in serious trouble. In telegraph lines, where iron wire is used, experience has shown that there may occasionally be found a joint of extremely high resistance. Incidentally, I may mention that in the electrical department in the city of Chicago there are several of these specimens preserved. The measurements of some of these are 2,000, 2,800, 4,000, 5,000, and one measuring 20,000 ohms. Each of these joints was taken from a working wire.

In conclusion, while primarily an electric light plant is dependent upon its own power and its insulation for economical results, no inferior factor in the question of success lies in the connections, whether these are permanent splices in the line wire, building post, screws at the lamps, or spring-jack contacts at the switchboard. In each of these, and all other contacts which may occur, we must not forget that the law of ohm is applicable.

—— The Bates Manufacturing Company, of Lewiston, Me., are increasing their electric light (Brush) plant.

The New Dynamo of the Brooklyn Electric Construction Company.

A front view of the new dynamo of Mr. E. R. Knowles, Electrician of the Brooklyn Electric Construction Company, is given in Fig 1. on this page. The complete electric lighting system of this company has been fully described in the ELECTRICAL REVIEW, and on this occasion we desire to call the attention of our readers to several advantages claimed for this dynamo. In a great many cases the field magnets of dynamos are not in exact magnetic balance—that is to say one pole is stronger than the other, causing asymmetry of commutation and consequent spoiling and burning of the brushes and commutator, and fluctuation of the current and heating of the machinery. Some machines have extension feet cast on the frame, as supports, while others have extensions cast on the poles for carrying shaft bearings. These projecting portions are more or less criticised as being detrimental to the distribution of the magnetic fields, and the attempt has been made in this machine to dispense with all such parts and to render the two poles of the machine perfectly symmetrical as to shape and mass of metal. By means of this the machine avoids undue sparking and heating and other attendant evils.

As will be seen from Fig. 1 the top and bottom magnets are made exactly alike; the machine is supported at its centers on a non-magnetic base, and the extensions on the poles are also of a non-magnetic material. The neutral line of the machine is exactly in the center of the yoke, and the distribution of the magnetic fields perfectly uniform top and bottom. The machine is given its present shape in order to lessen the weight of metal, and that the magnetic circuit shall be of as low resistance as possible.

The machine is very compact and powerful for its size, and is giving satisfaction. In Fig. 2 is shown an end view.

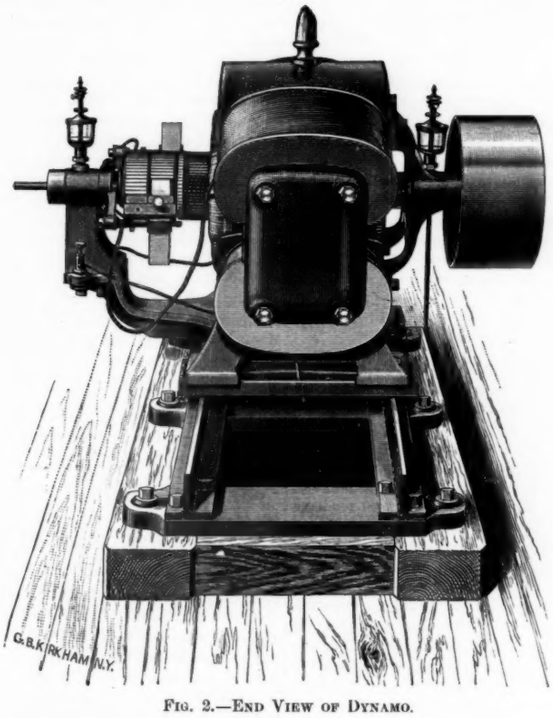


FIG. 2.—END VIEW OF DYNAMO.

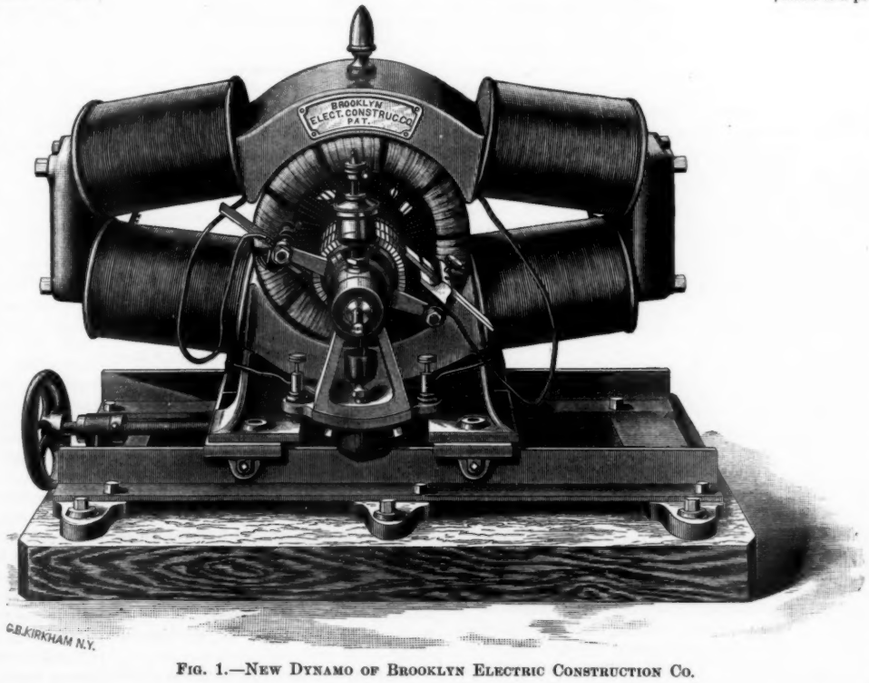


FIG. 1.—NEW DYNAMO OF BROOKLYN ELECTRIC CONSTRUCTION CO.

—— The Winthrop, Mass., Electric Railway Company has filed with the Secretary of State a copy of its invention, as called for by Section 5, Chapter 327, Acts of 1886.

Prof. Eaton's New Volt Am-Meter.

On the opposite page is given an excellent illustration of the new volt-am-meter, manufactured and invented by Prof. A. K. Eaton, the well-known chemist and electrician of Brooklyn. A technical description of this instrument has appeared before in these columns, and on this occasion we only desire to call attention to the fact that Prof. Eaton has made several detailed improvements, in point of compactness, ease of adjustment and convenience. A vertical graduated scale enables the operator to set the instrument for any desired range. A table is supplied with each instrument, showing the different positions corresponding to different ranges. The connecting plug represented on the left of the engraving is changed from one hole to the other, according to the requirements of the work. In the position represented, the instrument would give amperes of current. If changed to the other hole, electromotive force in volts will be indicated. On the right side of the engraving a reversing switch (which Prof. Eaton has recently improved) is represented by means of which opposite readings may be taken.

A Sub-Marine Monitor.

A sub-marine torpedo boat, invented by Prof. J. H. L. Tuck, was tested in New York waters last week and proved a success in the presence of a large party of gentlemen interested. They went aboard the steamer Chance Shot at Eighty-sixth street, North River. The sub-marine vessel lay like a gigantic turtle lashed to the steamer's side. She has been christened the Peacemaker. She was constructed at the yard of C. H. Delamater & Co., and is 30 feet long with a breadth of beam of 8½ feet, and a depth of 7½ feet. The bow and stern taper off from amidships, and the forward end of the vessel is surmounted by a dome 12 inches high, which is set with glass just large enough for the pilot to get his head into. Admission to the boat is through a circular scuttle abaft of the dome. At the stern there is a propeller and a rudder of ordinary fashion, and two horizontal rudders with which the boat may be deflected up or down. The interior is half-filled with machinery and mechanical devices, including a powerful little Westinghouse engine. Compressed air is stored in six-inch pipes running around the interior, and arrangements are made by which air may be supplied by chemicals. A gauge registers the depth of the vessel beneath the surface. Light is furnished by an incandescent electric lamp. At yesterday's experiment, Capt. John G. Holland and Engineer John H. Kline slipped down into the iron hull and fastened the air-tight scuttle. Then the captain's head appeared in the look-out dome, and the iron fish started up the river. She had not gone 100 feet before she dipped her nose into the water and gradually slid out of sight beneath the ruffled surface. The spectators anxiously watched the spot where she disappeared for three minutes, when she reappeared about a quarter of a mile to leeward and headed towards them. The Sylvan Glen was coming down the river only a few hundred feet above, and her captain was much surprised at the sudden appearance of the iron monster. He tooted his whistle vigorously and put his wheel hard aport, whereat the torpedo boat kicked up its heels and again disappeared.

The torpedo portion of the experiment was not tried. It is designed to use two torpedoes attached together by a chain and fired by electricity.

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NEW YORK, SEPTEMBER 4, 1886

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It has been deemed impossible that carrier pigeons could rival the telephone, but a wholesale baker, of Brussels, having fifteen branch establishments, sends to each, with the first morning delivery, a pigeon, which during the day returns with any unusual orders. At the bakery its alighting closes a circuit through a vibrating bell, and announces its arrival. The entire expense of purchase and installation not having exceeded the cost of two months' rental of a telephone, the baker felicitates himself on his happy evasion of the hello business.

A petition has been presented to the Mayor and City Council of Evansville, Ind., signed by over 400 firms and individuals, calling attention to the fact that the arbitrary suspension of the telephone service of that city by these officials has not only inflicted serious pecuniary loss, but great inconvenience and annoyance. It further states: "We believe that there is no prospect of relief from telephone companies claiming to have instruments not infringements upon the Bell patent, and we would therefore respectfully request that such action be immediately taken upon your part as will induce the Cumberland Telephone Company to resume operations."

The Minneapolis Exposition has been successfully launched. We hope to see the enterprise of the citizens of this western city abundantly appreciated.

The Fire Engineers of the United States have elected Chief Steer, of Providence, R. I., president of the Association, and re-elected H. A. Hill, of Cincinnati, secretary. There were nearly 200 present at the meeting in Providence last week, and a very pleasant week was enjoyed. The paper read by Prof. J. P. Barrett, of Chicago, was one of the best features of the Association. It appeared in full in our columns last week.

A novel sort of exposition is to be inaugurated in Paris in December. Every article in the various exhibits is to be in place, where the purchaser would require it in use at home. Furniture, tapestry, bronzes, pictures, flowers, etc., will be arranged in salons, bed-chambers, dining rooms, halls, etc. Theatrical performances will be given at matinees and evenings, and an exhibit of electricity in all its forms will add to the novelty of the exposition.

THE COMING TELEPHONE CONVENTION.

We would earnestly call the attention of telephone men to the assembling of the National Telephone Exchange Association (licensees of the American Bell Telephone Company), in St. Louis, September 7th, and to the urgent necessity for being present.

Matters of more than ordinary importance are to be discussed, and changes rendered necessary by recent legislation considered. The telephone has now come to be considered an absolute necessity among business communities, and they who conduct its business after the most scientific, exact and economical methods must, of a necessity, give the greatest satisfaction and do the largest and safest business, when cost of apparatus is considered.

It is certainly reasonable to believe, and perhaps it is not unsafe to predict, that the telephone of to-day, compared with its employment in the future, is only in its infancy. Instrument and methods of exploitation are likely to undergo radical changes. Indeed, changes are going on all the time, and the telephone man who does not watch and study them, and seek every opportunity to listen to others and compare notes, may at any moment awake to discover himself behind the times.

Telephone legislation must of a necessity occupy an important part in the discussion of the coming convention, and perhaps means may be found of protecting telephone interests from being seriously jeopardized by hireling politicians and ignorant legislators. Whether or no a State, having once licenced a company and given it the privilege of laying wires and conducting business, can, willy, nilly, and arbitrarily fix the rates of service, is a question which it is about time to settle once and for all. If it can, it has a power to subvert the rights of the people equal to that of the most tyrannical autocrat.

The principle involved—a principle based upon common law—is easy to understand. A corporation going into the field to give a general service to the public is given chartered rights. It agrees virtually to perform a certain service for that portion of the general public desiring and able to pay for it, the State on its part giving the right of way through the public highways, etc. With this understanding, the company proceeds to lay out its money, erect costly structures, and distribute costly apparatus. If the venture is a failure, the company loses its money—it can obtain nothing from the State. But if the venture happen to succeed, may the State turn upon the company and insist upon fixing its rates? Or may it assume any other censorship not "nominated in the bond?" This and other questions of importance will doubtless come up for discussion in the coming convention, and once more the ELECTRICAL REVIEW earnestly urges all telephone men to be in St. Louis on September 7th.

THAT PARIS TOWER.

Considerable anxiety has been manifested by *quid nunes* in Europe on account of the terrible dangers which will arise from the building of the great iron tower on the Champs de Mars. A recently published "chunk of wisdom" stated that all the locomotives in the neighborhood would be drawn to it and held by its permanent magnetism. Inasmuch as magnetism in a mass of this nature is polarized, and this polarity is broken at every lateral break and joint in the mass, and further, that the vertical magnet is broken up in the same way, it hardly seems as if the fear were well grounded. Then, too, some one discovered that a thousand feet of iron column would make an excellent lighting rod, which, while keeping open electrical communication between heaven and earth, would serve as an excellent broiler for such as chose to climb its giddy heights. The matter has been settled, however, by the *savans*, Messrs. Mascart, Becquerel and Berger, whose opinions were asked as to methods of protection against possible difficulties of this nature.

They direct that the mass shall be in metallic communication with permanent water below the surface of the Champs de Mars, by means of conductors of sufficient capacity to guarantee the noiseless discharge of a maximum quantity of electricity during storms.

These precautions, say they, will thoroughly protect the structure and all within it from the least disturbance or inconvenience.

Particular care will be taken, to insure the non-isolation of the column, and the whole will be, so to speak, one grand massive lightning rod, with abundant capacity and facility for carrying off the heaviest discharges. Not only vertical, but horizontal rods will reach into the surrounding atmosphere from the angles of the tower, to catch any stray lightning which may be gathering for a blow.

In the process of erection protecting lightning rods will be carried ahead of the workmen, like pioneer. Uhlans, who, with spears in rest and girdons flying, led the ad vanc of the army.

ELECTRIC LIGHT IN PARIS PUSHING GAS TO THE WALL.

From occasional letters to the popular press there would seem to be some uncertainty in the minds of a certain portion of the public as to just how much advancement the electric light has made in Paris. In order to furnish this information we have selected the following interesting figures from an article published in the current number of a French comtemporary: In Paris to-day there are in use 16,044 incandescent lamps and 2,225 arc lamps, including a small number of Jablochkoff candles. In reality there are many more than this, but of this number, which may be looked upon as the minimum, there is an easily get-at-able record. While making this enquiry, it may prove interesting to the reader to discover how much gas these electric lights displace. Supposing then we say that every incandescent light displaces one five-foot gas burner, and that an arc light or Jablochkoff candle displaces ten gas burners. This is a fair estimate, because these incandescent lights are of 16 candle power, and the five-foot gas burners have a like intensity only when first set up.

Allowing one carcel of intensity for an incandescent lamp, and 10 carcels for an arc light or Jablochkoff candle, we have, in round numbers, 38,300 gas burners displaced and superseded. Estimating 140 litres of gas an hour, these burners consume hourly:

$140 \times 38,300 = 5,362$ cubic meters with an average of four hours a day service for 365, days, we have:

$5,362 \times 4 \times 365 = 7,755,520$ cubic meters which at 30 centimes (a centime is the one-hundreth part of a franc, and a franc 20 cents) would have brought 2,326,656 francs into the gas coffers.

AN ELECTRIC CRADLE.

By reason of careful and comprehensive arrangements made by the ELECTRICAL REVIEW for the collection of news from all parts of the electrical field, it is a rare occurrence when anything new or original escapes our lynx-eyed correspondents. At times, however, we are confronted with startling bits of information concerning inventions said by the French and English newspapers to have originated in America, and yet not come to our ears or to that of any other American contemporary, popular or scientific. Here is such a case: Our French contemporary, *Bulletin International de L'Electricite*, quoting the *Moniteur Industrile* says:

"A recent and original application, and one which has, naturally enough, been made in America, is nothing less than an electric cradle, which is said to relieve the mother of much anxiety concerning the infant. For the distribution, operation and rental of these cradles, a company called the 'Electric Cradle's Company, having a capital of $1,000,000,' has been organized. The cradle plays a double role. By means of magnets on either hand, it is attracted to one side and then to the other, having an easy, pleasant swing to it that is calculated to delight and soothe the most troublesome kid. Two fine pieces of copper wire, running parallel the one with the other, pierce the mattress beneath the child, two centimeters apart and joining the opposite poles of the battery. Ordinarily the circuit thus formed, is closed; but if, by an event likely to happen at any moment even to the most well behaved and presumably hermetically sealed infant, the conductability of the material composing the mattress is augmented, the circuit is instantly completed and an electric bell informs the entire household of what is happening in the cradle."

We are told that this invention originated in America. We can only say that we came from America ourselves, and we have never heard of it. We do not deny its importance, we do not affirm it. Our French contemporary, *Moniteur Industriel*, seems to look upon it as one of the most useful inventions of the age. Perhaps it may prove so in France. Indeed a rumor comes to us that the inventor expects to find his best market there, and thinks of taking his electric cradle there altogether.

CHICAGO ELECTRICAL NEWS.

Mr. F. Rosebrook, of Elmira, N. Y., who is a dealer in automatic specialties, has been in Chicago recently, exhibiting "The Automatic Electric Heat Regulator," for controlling a "furnace by the atmosphere of the living room."

In other words, the thermostat—a metallic thermometer—closes or opens the furnace door—a ventilator, or a valve—at a previously arranged degree of heat. The electrical appliance in this form of regulator acts upon an electro-magnet, which in turn disengages clock work, and a half turn of a crank does the labor. Electricity in this case is like the mason's helper, who only carried the bricks up to the man who does the work on the building.

Chicago has been selected—and very properly so, too—as a Western agency for the new form of telegraphy called the phonoplex system, the outcome of the Smith-Edison-Gilliland system, which was exhibited here last spring on the Milwaukee and St. Paul's Milwaukee line, an account of which was given in the REVIEW at the time.

The phonoplex system is represented throughout the West generally by Mr. Paul W. Bossart, who is quite enthusiatic on the subject, and firmly believes that the invention has a large field of usefulness in the near future.

Superintendent Clowry, Electrician Summers and Superintendent Bristol, of the Western Union Telegraph Company, skipped off by the Northern Pacific Road on the 5th of August, and are all at Portland, Oregon, where they are enjoying cooler weather than that which would have been their portion, had they remained. Chicago August weather this year has been the cause of some considerable change of heart on the part of those who believe in Chicago as a summer resort.

Galveston, Indianola, and Fort Worth, Texas, dates of the 23d, tell of terrible cyclonic disasters and rain floods on the 19th and 20th of August.

At Indianola the storm, which is called a cyclone, "did its work in about five hours," according to the dispatches. A lamp in the office of the signal service exploded, setting the building on fire. Of five persons who were in the building at the time, two, Capt. Israel Reed and D. H. Rosencranz, of Elgin, Ill., perished in the flames.

At Galveston hundreds of houses were rendered tenantless by the sudden flood, which inundated one-half the eastern and southern portions of the city from one to seven feet. Havoc and desolation were present along the shore as far as the eye could reach.

The Beach Hotel was badly pounded by floating debris, water tanks and outbuildings were swept away, and the menagerie, a long row of cages on the beach lawn, containing birds and animals, was capsized and broken up, many of the animals and birds being either killed or escaping. Two Mexican lions were among the latter number, but these were shot before they had committed any depredations.

The total loss of life, as far as ascertained at Indianola, is as follows: Capt. J. A. Reed, signal officer; Dr. Crooker, Dr. Rosenkranz, Mrs. Hodges and two children, of Cuero; Mrs. Crooker, visiting with the last-named family; Mrs. Henry Sheppard; two children of Mrs. Max Luther, of Corpus Christi; Dr. David Louis, and a German, name unknown. The bodies of ten colored persons have been found. Elsewhere the loss swells the list to 38.

The estimated loss, on account of the storm, which extended some 200 miles inland, foots up roughly:

Crops.....	$1,000,000
City and town property.....	3,400,000
Shipping and harbor improvements.....	900,000
	$5,300,000

An estimate which it is claimed will fall below, rather than exceed the actual figures.

From the particulars given above, in addition to the fact stated, that the wind which blew so long, had an estimated velocity of 75 miles and hour, it is tolerably certain that this, like many another cyclone, is chargeable to the account of hurricanes.

* * A telephone transmitter has been patented by Mr. Herman Ehrlich, of Jersey City, N. J. It has novel features of construction, such as to admit of a very delicate adjustment of the carbon in position relatively to the contact points, and so that this adjustment may be easily maintained, and there is little danger of the parts getting out of order.

* * An electric annunciator target has been patented by Mr. Morris Ullman, of Washington, D. C. The target is divided into sections which have separate electrical connections, through a connecting cable, with the annunciator, which corresponds with the target, and is thus made to indicate the spot on the target struck by the bullet, the invention being an improvement on a former patented invention of the same inventor.

* * M. De Parvelle has called the attention of the French Academy of Sciences to a curious illusion of the vision which may account for the apparent oscillation or swinging of stars sometimes observed, and called by the Germans "Sternschwanken." When the eye looks for some time at a small, feebly lighted body, itself being in complete darkness, the body appears to oscillate or describe certain curves. It is a phenomenon of the subjective order, and appears to be of the same nature as the movement of a star observed when a person leans the head against a wall, and fixes his eye upon the star. The star appears to be agitated in its place and to oscillate rapidly. In order that the motion may be noticed, there should be no moon, and the sky should be clear. A lunette takes away the apparent motion.

MORE LIGHT IN DETROIT.

(*Continued from first page.*)

riedly gathered, show that all sections of the country are represented—a complete list I will forward with full report.

MEETING OF EXECUTIVE COMMITTEE.

The meeting of the Executive Committee was held yesterday for the purpose of arranging the programme. Messrs. Gilbert and Boyer were elected members of the committee.

COMMENCEMENT OF THE WORK OF THE CONVENTION.

The convention was called to order at noon on Tuesday by Vice-President E. R. Weeks, of Kansas City, President Morrison having been suddenly called home on Monday evening on account of the severe illness of his wife.

Immediately following the routine of opening the convention, which was done very handsomely and appropriately by Mr. Weeks, the programme, which had been formulated by the Executive Committee, was adopted, and the reading of papers arranged:

On Standard Wire Gauges—R. W. Pope.
Electric Subways—E. R. Weeks.
Wire Joints—C. C. Haskins.
Incandescent Carbons—D. D. Dickey.
Carbon Points—Geo. W. Parker.
Relation of Parent to Sub Companies—A. J. De Camp.
Legal Matters—Arthur Stewart.

We shall not attempt to give an official account of the proceedings of to-day in full, as our next edition will cover the whole ground in detail, together with description of several very interesting electrical devices among which we notice prominently the Sun Electric Company's new distributor, the Baxter and Edgerton motors and others.

The outlook to day promises well for one of the most interesting meetings as yet held, and Philadelphia is talked of as the place of meeting for next convention.

The Electrical Torpedoes.

The Sims-Edison electrical torpedoes, which have been mentioned in these columns before, are meeting with much favor not only with our own Government but with a number of foreign countries. Eight of these torpedo boats have been delivered to the U. S. Government, which promptly paid for them, and two more will be ready in a few days, which will fill the present contracts.

Seat of the Electromotive Force.

Professor Brackett's address, before the Association for the Advancement of Science, was essentially a resumé of the history of the investigations to find the source of the current in galvanic batteries. No attempt was made to settle the question, which has been so long a bone of contention.

The address was so purely historical in its nature, and, withal, was so condensed and concise that any abstract would be necessarily little more than an index of its contents. Those who are interested in the subject must await its publication in full in the "Proceedings" of the association.

Galvani's two accidental discoveries were made in 1789; the one was the influence of an electrical machine in causing contractions in a frog's legs, and the other the production of sufficient electricity to cause the contraction by touching two joined strips of copper and zinc to the moist animal tissues. Naturally, from these results there arose a theory of the identity of nerve force and electricity—the so-called animal variety of electricity. While this controversy, soon to subside, was started among physiologists, a much more violent one has continued to rage among physicists. Is the electricity of the galvanic cell due to chemical action or to contact of dissimilar substances? It is to the history of the attempts to answer this question that the address is devoted.

A telegraphic description of the opening of the fourth convention of the National Electric Light Association appears on pages one and five. In our next issue will be given the complete story of the valuable work of this convention.

NEW ENGLAND ELECTRIC LIGHT NEWS.

WESTFIELD, MASS.

The plant of the Schuyler Electric Light Company, of Westfield, Mass., was started in May last. There are two 30-light machines supplied automatic regulating apparatus, so that the electromotive force is varied as lamps are turned on and off, without attention on the part of the attendant. In all 44 lights are run in two circuits. There are 13 arcs employed in street lighting, for which the company has a year's contract at $180 per year per lamp burning all night. The motive power is a 75 horse-power Ball automatic engine. The dynamos are belted directly to both fly-wheels of the engines; and the engine regulates perfectly whether one or both machines are used. A pressure damper regulator so controls the draft that the steam does not vary over 1 lb. at any time. Great credit is due to the company for the enterprise in pushing ahead, in spite of the bitter opposition of the gas company, who to hold their own, were obliged to reduce the price for gas to $2 50 per 1,000 cubic feet.

NORTHAMPTON, MASS.

The new station of the Thom son-Houston Electric Light Company is a great improvement over the former building. A part of the plant was in Florence and the remainder in Northampton, where the power was hired. The new station will be equipped with 150 horse-power Corliss engine. In the dynamo room, which has space for ten machines, there are to be four 30-light 6-ampere machines. A 300-light incandescent machine will soon be added. At present 55 arcs are used for city lighting, and 30 for commercial purposes, with a prospect of a large increase this fall.

F. M. G.

August 18.

PITTSFIELD, MASS.

The town of Pittsfield is one of the most enterprising in the State. Two years ago a company was formed to operate an arc light plant of the Thomson-Houston system. The plant started with eight lights. The demand has continually increased, and at present 64 1,200 candle-power arcs are run from a 45 and a 30-light dynamo; 18 lamps are used for street lighting. Four circuits are run. At present very soft uncoppered carbons are used, giving great satisfaction to customers, on account of the whiteness and steadiness of the light. The plant will be further increased at once by a 300-light incandescent machine. Wires have in part been strung, and nearly the whole number of lights rented. C. E. Merrill is superintendent and general manager of the company.

Tillotson & Power Woolen Manufactory have contracted for a 250-light incandescent Consolidated plant, using the compound wound automatic Thomson dynamo.

The factory of L. Pomeroy Sons will be lighted by a 70-light incandescent plant of the same system.

August 28. F. M. G.

* * Those of our readers who expect to store electricity by the use of windmills will be interested in one that has been patented by Mr. Andrew J. Lindquist, of Bertrand, Neb. It has a central revolving standard or tower, and the wheel is mounted slightly to the left of the axis of the tower, so that when the wind becomes too strong the wheel will turn out of the wind, while there are devices by which the mill may be regulated to run faster or slower, and run automatically, practically regulating itself.

* * The superintendent of motive power, etc., of a western road which has about 60 locomotives, and over 4,500 cars, has no draughtsman, but carries all the plans, etc., for new designs, as well as for rebuilding, in his herd. He is very successful, and keeps well up with the times in improvements in rolling stock, but necessarily works at a great disadvantage. Such men have to yield to the ideas of economy which are held by the management, but they know very well that the results are not economical. The tracing board and blue prints would save such roads far more than they cost.

For light objects, a convenient cement is thick orange shellac.

Marine glue is made by dissolving one part raw India rubber in twelve parts benzine, and to the solution adding twenty parts powdered shellac, heating the mixture over the fire with great caution. Apply hot with a brush. It is waterproof, and will resist the action of acids, and may be used in making wooden battery jars or for other purposes.

Food given when cold is more likely to be retained by a sensitive stomach than in any other condition, and ice will not be rejected when all other substances are thrown off; acting upon this fact, frozen milk is now given in cases of sickness attended with irritable stomach, especially in fevers.

Battery carbons can be easily cut with a hand-saw moistened in water.

Paraffine is the best material for protecting polished steel or iron from rust.

A substitute for copper in Daniell's battery can be made by brightening sheets of ordinary sheet tin, and plunging them into a very weak copper-plating solution in connection with a galvanic battery of very low quantity. In 15 or 18 hours a tenacious film of copper will have been deposited upon the tin, and the plate can then be bent in shape suitable for the battery.

Mr. W. M. Symons proposes a cheap but convenient galvanic battery; each of the zinc plates are 2 inches square, and covered with fustian or other fabric, outside which thick copper wire is wound to form the other plate; the exciting liquid is weak chloride of zinc. Pairs of plates thus made can be arranged in series to form a battery to give out weak currents for a great length of time.

The simplest and quickest method of amalgamation of battery zincs consists in immersing the zinc in a liquid composed of nitrate of mercury and hydrochloric acid. A few moments are sufficient for the complete amalgamation of the zinc however soiled its surface may be. With a quart of this liquid, which costs less than 50 cents, 150 zincs can be amalgamated. The liquid should be prepared in this manner: Dissolve in warm water 200 grains of mercury in 1,000 grains of aqua regia (nitric acid 1 part, hydrochloric acid 3 parts). When the mercury is dissolved add 1 000 grains of hydrochloric acid.

To make a japan for iron, mix shellac varnish with a sufficient quantity of ivory black or lamp black. Other methods are the following:

(1) Asphaltum, 1 lb.; melt and then add balsam of copaiba and thin turpentine.

(2) Grind lamp black very smooth, and add copal varnish to the proper consistence.

(3) Asphaltum, 3 oz; boiled oil, 4 qts.; burnt amber, 8 oz.; mix by heat, and when cooling thin with turpentine.

(4) Amber, 12 oz.; asphaltum, 2 oz.; fuse by heat and, add boiled oil, 1½ pint; resin, 2 oz.; when cooling, add 1 pint of turpentine.

To soften bright work without damaging the finish, place the pieces in an iron box and fill in the interstices with iron turnings; close the box, lute the cracks with fire-clay and heat to a red, allowing the box to cool as slowly as possible. It is a good plan to let the furnace fires go out and leave the box in the furnace to cool.

Telephonic News

⁂ Ground has been broken in New York City for burying the electric wires.

⁂ The time to see that all telephone lines are in good condition for the winter campaign is this month.

⁂ Additional telephone work in South America is being projected by gentlemen identified with the Bell interests in that country.

⁂ General Manager Sargent, of the Brooklyn telephone Company, has several streets of that city laid with underground conduit, and will soon fill them with telephone cables. The work has been under the sanction of the Brooklyn Subway Commission.

⁂ The Commissioners have granted permission to the Chesapeake and Potomac Telephone Company, at Washington, to reset several of their street poles which have become worn out, but not to increase the number.

⁂ The experience of telegraph operators, inspectors and linemen brings them into close acquaintance with all sorts and conditions of faults in connection with their work; the variety of these faults is wonderful, many stranger than fiction. One of the most curious in connection with telephony which we have ever known has just happened within the last few days at a place called Moss Bay. The lineman's attention was called to the circuit in question as hearing was difficult; on listening at the telephone he heard a "sort of booming which came on intermittently, very much resembling the distant roll of the tide, and which rendered speaking and transmission of work almost impracticable." Having satisfied himself by the usual methods that the instrument was right and the line free from induction, and that it was not picking up vibrations, the conclusion was arrived at that the fault must be in the general office, Moss Bay. An examination of the telephone apparatus disclosed a novelty. A huge bee was in the telephone, and, in trying to make good its escape, it had become fixed between the sounding board and the microphone, and it had hummed to the extent of interfering with the human organs of the circuit. How the bee came there the lineman cannot say, whether by accident or design he knows not, but the bee was the cause of the fault. In concluding his report, the lineman candidly states: "I have met some very tedious and technical faults in various telephone apparatus, but I never was done by a bee before."

⁂ A Detroit reporter has been interviewing the telephone operators of that city to see if they are getting deaf. The operators contend that their hearing is rendered more acute by its use, but that the constant reiteration of the "hello" for hours in succession has a tendency to weaken the bronchial chords, and that, after a few months' service, they suffer from throat troubles, which ultimately incapacitate them for further work. One of the young ladies employed at the "Central," when interviewed upon the subject, boldly declared that her hearing had been improved since she entered the company's employ. "When I first came here," she said, my hearing was rather defective from chronic catarrh in the head. I have now been on duty for months, and find that I can hear better than I could when I began work. I am sure there is nothing about the 'phone' which can affect a person's hearing." A well-known medical gentleman, who is an authority upon auricular diseases, remarked: "I have no data upon which to base an opinion, but am satisfied that if the wires are not in first-class order, or if a person uses a telephone habitually in a noisy place he will find a gradual deafness coming upon him. As a matter of fact there are numbers of people who do not know to-day how much either their sight or their hearing is impaired. People who pride themselves upon their hearing or keen eyesight really enjoy about one-fifth of the senses which nature gave them. I have had one or two persons call upon me for treatment for deafness, who attributed their affection to a too constant use of the telephone. I could not say positively, however, that was the cause. I believe if the wires are right, and there is no sudden shock, the use of a telephone would improve the hearing just as the exercise of a muscle will develop it. Still I cannot definitely tell just how much one's hearing will be affected by using the telephone."

More Long Distance Telephone Lines.

The American Telephone and Telegraph Company are now constructing long distance telephone lines between New York and New Haven, the wire to be of hard drawn copper—in fact nearly a duplicate of the New York and Philadelphia lines. It is the intention of this enterprising company, we understand, to extend the line on to Boston, and in time present to the public of New York and Boston immediate and satisfactory verbal communications.

Telegraph Wires Going Underground in Brooklyn.

Information regarding the work undertaken by the Brooklyn branch of the New York and New Jersey Telephone Company, in the substitution of underground instead of overhead wires, under the supervision of the Electrical Subway Commission, has been given in these columns some time since; and what is now to be added to it of a newsy character is contained in the following statements from an authoritative source:

The local company has sent to the State Controller a check for $15,500 as part of the amount assessed against the electrical companies in Brooklyn for salaries and expenses of the Commissioners of Electrical Subways. The telephone company was recently notified that the total amount assessed against it for these purposes, under the law creating the commission, was $23,252.52. The total amount assessed against New York and Brooklyn companies is $80,000, of which $30,000 is charged to the Brooklyn companies alone. These include the Western Union, the Baltimore and Ohio, the American District and the Brooklyn District Telegraph companies, and in addition the New York and New Jersey Telephone Company. Deducting the amount charged against the telephone company from the total, leaves $6,747.48 for the other companies to pay.

Subway Commissioner Reynolds, to whom the State Controller's communication was sent by the telephone company, wrote in reply that he had verified the calculation of the Controller's office, and added that the total mileage of wires in Brooklyn belonging to the several companies is 4,589, of which the telephone company has 3,557.

The Subway Commission, which has been in operation since the fall of 1884, has not yet been paid one cent, although its expenses were to be met by the assessment of the electric companies interested. These, including the salaries of the commissioners, will now be paid out of the amount forwarded to the State Controller by the telephone company.

With reference to the work of substituting underground wires for overhead use, General Manager Sargent, of the telephone company, says that it has now 150 miles of underground wire in operation, and that by the end of this year it will probably have 2,000 miles. This is explained by the fact that the subways to acccommodate at least that amount of wire are already laid.

Electricity Defined.

Prof. Le Corguille, in the *Moniteur Industriel*, answers this question, "What is electricity?" as follows:

"Electricity may be considered as the whole range of phenomena which arise from the condensation, the rarefaction, or the movement of the ether either around or in the interior of masses of matter. But, inasmuch as any movement of the ether necessarily implies both rarefaction and condensation, the above proposition in reality attributes the phenomena of electricity to one unique, primordial cause—a variation of the normal force of elasticity of the ether at any point."

An Electrical Story.

In the town of Electropolis, after many years of agitation, the telegraph wires were put under ground. Then followed the electric light, telephone, and fire alarm wires. Not satisfied with this, a movement was made to provide conduits for the distribution of milk, beer, groceries, provisions and fuel. The town was rent by the dissensions caused by the fights between the "overs" and the "unders," as the rival factions were called. C. Rosstalk, one of the "unders," had fallen in love with Miss T. Aken, the daughter of a leading "over." Among the numerous wires in the town, there was a complete exchange of the Electrical Gustatory Supply Company, a local infant company, which on the principle of "taste a mode of motion" was supplying to regular subscribers all the pleasures and enjoyment of food and drink without the expense, annoyance, and ill-effect of eating and drinking many things. The eating of the common place dish of oatmeal, or the drinking of water, could by this process be made to taste like any dish or drink desired, the vibrations of which could be produced on the machines at the central office. C. Rosstalk was wont to invite by telephone his beloved to partake of the mellow lemonade, or the enticing ice cream.

One evening while reading, he heard a call from Miss T. Aken, who wished to set her watch exactly. Our friend extended an invitation to her to lunch. The vibrator receivers were connected to the tongue, and an order was given for sherbet, champagne, cake, etc. All at once a shriek was heard. Rosstalk inquired the trouble. No answer. He felt as though he were eating the most limber kind of Limberger. Breaking connection with difficulty, as he was nearly overcome, he found that his darling's door was closed to him. His card was returned with the message that thereafter Miss Aken would not be at home to Mr. C. Rosstalk. The thought flashed on his mind that something was the matter with the supper to which he was treating his betrothed. Straightway to the central office he went, and by actual experiment convinced the manager that the dessert for No. 98 (German family) had been switched on to No. 987,621. The manager thereupon called up the young lady, most humbly begged her pardon, and averted what might have been

Bell Boys Must Go.

Electricity has done a great deal for the safety and comfort of guests in hotels and large houses. Among recent important inventions, utilizing electricity, is the Hess Electric Guest Call and Fire Alarm. With this apparatus the service of bell boys is largely dispensed with. This is an electrical annunciator working both ways from the office to the rooms and the rooms to the office, enabling those on duty in the office to awaken their guests in the morning, and by a system of signals obviate the necessity of bell boys answering the bells to see what is wanted.

This in every way facilitates and makes the service of the bell boys more reliable. It takes the average bell boy quite long enough to take things to a room without first having to go there to inquire what is wanted.

The chief use of this system is to call guests from the office by pressing a button in the annunciator, which rings a bell in the guests room (and in the early morning) to awaken guests instead of sending a boy through the halls awakening all the guests except the one wanted.

An instantaneous alarm can be given by it in all the rooms on one floor, or all the rooms in the hotel, in case of fire.

This is done by simply moving a lever by those in charge at the office.

When this invention was first offered to the electrical trade and the public the impression prevailed that it required a large amount of battery to operate it, and that it was more or less complicated.

The Standard Electrical Works have so modified the apparatus that they now state it operates with less battery than any electrical device of the kind, and is very simple and not liable to get out of order. It is fast becoming the standard for this class of service, and is now in use in over 100 prominent hotels in the country. The Standard Electrical Works, the sole manufacturers of this apparatus, are giving its manufacture their special attention, which warrants it being made in the very best possible manner, and the fact that a large number of the standard electrical houses of the country are acting as agents for the sale of this apparatus shows conclusively its merits.

Tram Cars in Germany.

There has now entered upon active duty at Hamburg, Germany, a tram-car that obtains its power from accumulators carried by it. Herr Huber, the engineer in charge, was one of the members of the board that awarded the tram-car run by the Julien accumulators at the Antwerp Exhibition, the first prize, in competition with several other forms of locomotors.

The Hamburg car, which will soon be supplemented by others, weighs, fully equipped, 4,830 kgs. Of this weight, 1,200 kgs. is that of the accumulators. The accumulator consists of 96 cells, of which every three are united in a single three-cell holder. The cells are formed out of a new material, something like hard gutta percha, but rather more flexible. Each cell contains fifteen plates, seven positive and eight negative. The plates have a surface of only 134 by 147 mm., and are about 4 mm. thick. The charging requires about eight hours.

The accumulators are distributed in eight low wooden boxes, of which four are stowed away on each side of the car, in the space under the seats. The boxes move along greased slides, and can easily be drawn out by opening two long traps in the side of the car. In the car-house, the vehicle is drawn between two tables, on which the charging takes place, and the accumulators are slid from the car on to the tables. The shunting of the boxes, both in the car and on the charging-table, takes place automatically by a contact apparatus, both simple and sure, constructed by Herr Huber.

Four double conductors lead from the accumulators in the car, which are shunted in four groups, to the Julien commutators, of which one is placed on each platform. By turning a handle that forms part of the key of the commutator, six different positions can be given to it, namely:

(1) So that there is no connection between the accumulators and the motor. (2) The four groups of accumulators are connected in parallel arc and placed in connection with the motor. (3) The groups are connected two and two in parallel arc, and the two pairs in series and in connection with motor. (4) Two in parallel arc behind the other two in series. (5) All four groups in series. (6) All four groups in parallel arc, but unconnected with the motor. The commutator stands in this position, with the key up, during the periods of stoppage.

A great advantage of this arrangement is that different velocities are obtained without the application of any current regulator or resistances.

The positions 2, 3, 4 and 5 of the key correspond to the E, M, F's 48, 96, 144 and 192 volts on the motor; and its velocity again corresponds to these E, M, F's. The normal current amounts to about 18 amperes, while on inclines and curves the current may sometimes reach 80 amperes. The motor is a Siemens series machine, model D, with about 0.6 ohm resistance. It is hung under the car, and transmits its power by means of hemp cords to a loose axle between the two wheel-axles, and from hence the power is given out by means of chains to the wheel-axles. The hempen ropes are protected as much as possible against the influences of weather, by a special preparation.

The reversal of the direction of rotation of the machine is brought about by changing the position of the brushes. There are two pairs of brushes, about 90 degrees apart, of which only one pair rubs at one time.

One charging is sufficient to drive the car 50 kilometers. Since such a car has to traverse about 100 kilometers daily, one change of the accumulators is enough.

A Human Electric Reservoir.

The following story comes from Louisville, Ky.: David Lindley is an old Irishman who lives on Milk street. He is possessed of a singular affliction. About four years ago he was standing under a tree at Winter's Gap, East Tennessee, when a violent storm came up. The tree was struck with lightning and fell to the ground. Lindley was rendered unconscious by the shock, but otherwise was uninjured. During every electrical storm since he has experienced a peculiar tingling all over his body, similar to that produced by an electric battery. When the storm ceases the sensation leaves him, and is not again felt until a storm comes up. Any person can receive a slight shock by catching hold of his hands during a storm. It is frequently tried by his neighbors, by whom he is considered a magnetic wonder. Mr. Lindley's health is in no wise impaired by the electricity, and he is of the opinion that it benefits. During a recent storm the shock was much greater than usual, and the effects have not entirely left him. He has a constant fear of the lightning, and predicts the approach of a storm.

The Electric Light in the Minneapolis Opera House.

In the house there are seven hundred incandescent electric lights of sixteen candle-power each, including a flash light for the leader of the orchestra, portable bunch lights and ground rows, borders, proscenium arch, balcony fronts, umbrella, foyer, boxes, offices and dressing rooms. These lights are all operated by levers almost in the same manner as gas, and any circuit may be turned off or on at pleasure without interfering with the others. By one movement alone 155 lights may be turned off or on at once. In the construction there are used five miles of copper wire, numbered by size from 0 to 18 by the Brown and Sharp gauge. This wire is insulated with doubled braided cotton and asbestos, approved by the National Board of Fire Underwriters, besides the water-proof okonite.

The whole plant consists of a New York Safety Steam Power Company's engine of 80 horse-power, and two of the United States Electric Lighting Company's dynamos, with a capacity of 300 lights each. The time occupied in equipping the house with this light was five weeks. The engine was shipped from New York in seven days. The engine has two fly-wheels, 48 inches in diameter, with a 12½-inch face, upon which the belting runs which connects it with the dynamos. The governor is in one of the fly-wheels, which make 300 revolutioes per minute. There is apparatus in the engine-room which tells the engineer how many lights are running and the amount of electrical pressure—the strength of the light being dependent upon the electrical pressure. This works automatically and keeps the pressure constant, which is of the highest importance, owing to the sudden variations of the number of lights and candle-power during the performance. Another apparatus in this room shows at all times whether the circuits are in good condition, and do not touch any conductor that would ground them. This is called the ground detector. By means of a switch the branch or portion of any circuit grounded will be burned out, and the trouble can at once be found and remedied.

From the engine-room a large copper conductor connects with the first entrance of the stage, and from this point starts twenty-five different circuits through the house. Each circuit can be controlled by means of a switch from which all the lamps can be lighted to full power or extinguished. Each circuit has two safety plugs, the same being strips of alloy which will fuse when at a temperature of 155 degrees Fahrenheit. If anything goes wrong, these strips would fuse, and thus prevent dangerous overheating of the copper conductors.

The flash light for the leader of the orchestra is operated by means of a button, which at the same time rings a bell upon the stage as the signal for the rise of the curtain. The portable bunch lights are used upon the stage to give sun and moon effects, and are connected with the circuit by a plug. Under the stage are resistance boxes, consisting of coils of iron wire leading to the circuit. There is a half-mile of this wire weighing about thirteen tons.

The test the first evening proved perfectly satisfactory.

Telegraph Linemen.

HOW POLES AND WIRES ARE PUT UP AT THE PRESENT DAY.

One of the most important classes of employes in the service of the various telegraph companies which run their network and labyrinths of wires throughout the country are the linemen. They are the strong fellows who raise the poles and attach the wires. It is not by any means an easy occupation, and requires considerable skill and endurance. The position of a lineman is one which an ordinary laborer could not fill, because it involves considerable knowledge of engineering, and at times a nimbleness not required of the pick and shovel. In the early days of telegraphing a good lineman was a rare article. His duties were very arduous. Pat Whalen, boss of the Cincinnati corps of Western Union linemen, has grown gray in the service. He is probably the oldest and most experienced man in his business in the West, says the Cincinnati *Enquirer*, and what he doesn't know about raising telegraph poles and mounting wires is hardly worth learning. Pat began his career with the old Union Telegraph Company on the 10th day of June, 1856. At that time there were but seven wires running into this city, which were known as the House Line, the Wade Line, the C., H. & D., the Little Miami, and a line from here to Springfield. Shortly after Mr. Whalen want into service, the Union and National, two rival companies, were united into what has become the Western Union Telegraph Company. The veteran lineman has an interesting fund of reminiscences of his career. Very few people know much about the labor of preparing a telegraph line for use. The first step is to put up the poles, run the wires, attach the batteries, and then the lightning jerkers can proceed to business. Whalen's initial experience as a lineman was in putting up the wire from Cincinnati to Indianapolis. It was comparatively slow work in the absence of the many facilities which have since been brought into use. The holes for the poles were dug with an ordinary spade, the poles were with difficulty elevated to their proper place, and the openings filled up. At that period the operators used the instruments which printed the characters on a large roll of paper, such as are now used in giving stock reports. Then the men, in adjusting the wires, were compelled to use ladders, as accidents sometimes occurred. Ladders have now been superseded by climbing hooks which are considered equally safe and more expeditious. Linemen make from thirty-five to forty dollars on the road besides their board, while in the cities they are paid from sixty to seventy dollars per month. The exciting time for line-men is when a long stretch of wire is thrown down. The causes of breakage are heavy storms or sleet. Whalen remembers when at one time sixty miles of wire were broken by the sleet on a railroad running out of this city. It took two or three days to repair it. Since the telegraph companies became so powerful and extended their field of operations into every hamlet in the land, the demand for telegraph poles has almost exceeded the supply. Those used by the Western Union come from Monroe, Mich., where they are made by contract. A thirty to thirty-five foot pole costs from $1.50 to $4, and the big fifty-foot poles put up in the cities can not be bought for less than $7 or $12. Along railroads and turnpikes there are from thirty-five to forty poles to each mile, but in the cities they are separated by a distance of only 120 feet. The posts are of cedar and will last not less than fifteen years. A crowd of curious spectators can always be found around the place where a gang of linemen are engaged in raising a great telegraph pole. The work is watched with eager interest, and the process is as simple as it is methodical and sure. A large hole, seven feet deep, is dug, and the pole is laid so that the base rests at the edge of the aperture. The post is raised from the top and a crutch is put under it to hold it stationary. Then the men with long iron forks shove against the pole, which slowly rises, and the crutch is pushed under further and further. The base goes gradually into the hole, and is kept from slipping by strong timbers placed against it. A more common way to raise a telegraph pole is by a derrick, and this method is considered somewhat quicker. The post never falls when elevated by a derrick, but does occasionally when forks are employed. The country linemen are, like members of the fire department, liable to be summoned for duty at any time. Once in a while, especially after a heavy storm of sleet, their work is attended with great peril, and they must become accustomed to the hardships of winter.

An Electric Mountain.

A very peculiar property has recently been discovered in the rock of a mountain seven miles from the town of Santa Cruz. This rock is heavily charged with electricity, and when applied to a battery was found to produce strong electric currents. A small handful of this rock applied in a battery generates sufficient electric force to operate the battery for three weeks and appeared not to be the least exhausted of its powers. This rock has very much the appearance of ordinary soapstone and exists in immense quantities, constituting the principal mass of the mountain. Its strange property was accidentally discovered by a man who was experimenting with mineral water on the mountain, and having occasion to use some of this rock, placed it in contact with the battery. The man who made this wonderful discovery kept it a profound secret from the world until he and one or two of his confidential friends had obtained a title to the portion of the land, paying $15,000 therefor. The present owners are now experimenting with this rock, with a view to thoroughly testing its properties. The result of such investigation we can only surmise, but are very anxious to learn.—*Tulare Free Press.*

Prizes for Electric Motors.

Among the subjects selected for prize competitions in 1887 by the French Societe d'Encou ragment, electricity takes a prominent place. For instance, a prize of 2,000 francs is offered for a small motor designed for a small workshop to be worked separately or to be connected with a central factory. A prize of 3,000 francs for a medium of transporting to a considerable distance natural mechanical powers which their actual position does not allow of being immediately utilized. A prize of 3,000 francs for the invention of a simple and substantial appliance capable of indicating automatically in a sure and regular manner, at a given distance, the speed of a railway train. A prize of 3,000 francs for the construction of an instrument transmitting to a distance an indication of the temperature of a heated inclosure. A prize of 3,000 francs for the discovery of a perfect process of transmitting to a distance motive power to agricultural machines. Competitors must send in their contributions before the 1st of January next.

A New Lecture Lantern.

Prof. A. Gray and Mr. T. Gray have devised a new electric lantern for lecture purposes. It consists essentially of a small Gramme motor combined with an arc lamp in such a way that the revolution of the motor moves the carbons in opposite directions, and keeps the arc sensibly constant in position. The lamp itself has several advantages; for example, the addition of condenser lenses. The distances of the lenses from the arc can also be changed. The magnification can be readily adjusted to suit the distance and size of the screen, or, on the other hand, a parallel beam may be obtained for spectrum illustration. Moreover, the image of the arc itself can be projected on the screen, to show the mode of wearing of the carbons, the effect of placing impurities in the arc, or the attraction and repulsion of currents and magnets on the arc

TELEGRAPHIC

.... The National Automatic Fire Alarm Company of New York has been incorporated with a capital stock of $200,000.

.... John G. Richardson, telegraph operator at Newcastle, Ohio, was run over by a freight train last week while taking car numbers, and received fatal injuries.

....Electroplating with silver upon wood is now successfully performed, the process being adapted to handles of all kinds, including umbrellas, canes, carving knives, etc.

.... An electric railway is soon to be constructed in Pittsburgh, and another in Allegheny City. The length of the line in the first-named city will be about two miles, and the maximum grade 100 feet per mile.

.... The cable telegraph office at Mexico City has been placed in charge of Mr. Emilio M. Salazar y Murphy, a competent telegrapher and linguist. The appointment gives entire satisfaction to the mercantile and financial community.

.... Thefts of money from garments hanging in the clothes room of a Meriden factory led the electrician of the establishlishment to try to catch the hitherto undetected thief. He connected a pocket-book in the pocket of a pair of trousers with wires that terminated at a gong in a distant room, and so arranged the wires that the gong would ring when the pocket-book was moved. The pocket-book was moved, the gong sounded, and the thief was caught.

.... A Camden, N. J., man has invented and is having built an ocean tricycle. It will be made entirely of iron and steel, except a small platform where the operators will stand. The wheels will be eight feet in diameter, and will be worked by levers from the platform, which will be 27 feet from the ground. The idea is to run this machine out to stranded vessels when they lie in water not over 20 feet deep. The inventor says that three miles an hour can be made with the tricycle.

.... The Western Union Telegraph Company's crew of some forty line men are engaged in the work of reconstruction between Bangor and Portland. All the repairs which were necessary from the great storms of last winter have been made. Experienced telegraph men are of the opinion that at least five years' ordinary wear was made on the line at that time. Work will soon begin on the building of a new line on the old route from Gardiner to Wiscassett, Rockland and Belfast, the cost of which, with the present reconstruction, will be between $35,000 and $40,000.

.... The North American Telegraph Company has succeeded in building its line from Duluth to Minneapolis, and from Minneapolis and St. Paul to Chicago. It has constructed a most substantial line, and is now ready to do business. The gentlemen who have organized this new company are worthy of all credit. They have put their hands down deep in their pockets and have provided the wherewithal to build a new line, with no other hope of reward than the improvement and ultimate establishment of a first-class telegraphic service in these two cities. The people should see to it that the new company is well patronized.

.... An ingenious little instrument called the "hyalolyphotype," or (more sensibly) hot pen, has been invented, by means of which drawings can be made on glass or glassy substances with a waxy composition, which is solid and somewhat hard at ordinary temperatures. The pen can be heated by gas or electricity, and when heated the waxy material flows easily from it, setting so quickly on the glass that cross patching can be done more rapidly than with ordinary pen and ink, without risk of blocking up the angles. Corrections can be made with a penknife. After the drawing has been made, the plate is etched by fluoric acid, and when complete it can be either electrotyped, stereotyped, used directly, or applied to any purpose for which engraved surfaces are required.

ELECTRICAL AND SCIENTIFIC

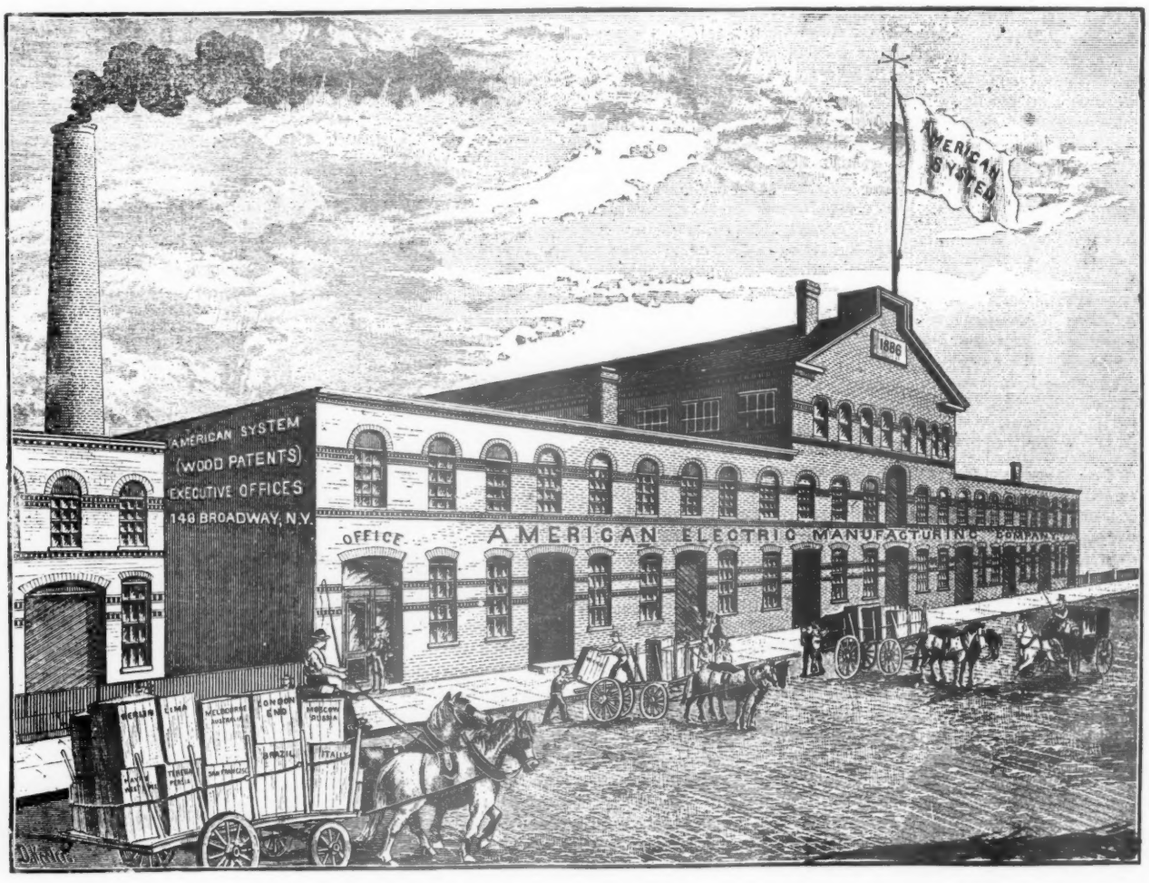
* * Somewhat of a sensation was created in the anthropology section of the American Scientists at their Buffalo meeting by a paper on characteristic curves of composition, by Prof. T. C. Mendenhall, of Washington, who, by erecting mathematical curves from counting the letters in the words of any long letter of an author, finds it identical with any curves erected from th same author wherever the letters are counted, and that the curves of different authors are not identical. The author proposes to solve by this method the question as to Bacon's authorship of Shakespeare. Many members declared that the test would be sufficient.

* * An evening or two since, as Phil. Hahn, the engineer in the electric light room of the Arcade, was fixing a lamp, he had one and on an electrified rod and the lamp in the other. It happened that the screw attached to the lamp became loose and fell on the floor. Phil., still holding his thumb on the tip end of the electrified rod, stepped off of the dry-board on which he was standing, when the result can better be imagined than here depicted. Globe, lamp and carbon flew through the air like dust, and the man himself went heavenward in angle-like flops. Phil's hat was sent flying across the room and lodged in a beam up in the ceiling. Absent-mindedness while operating an electric machine never pays.—*Springfield, Ohio, Times.*

* * The other evening, in Easton, Pa., while everybody was wondering why the town was kept in darkness, there was considerable scampering around the electric light works. When the steam was turned on for starting the engines there was a loud report, and in a moment the room was filled with steam. The trouble was caused by the breaking of the globe in front of the throttle-valve, through which steam enters the steam chest of the left hand engine. As no new valve was on hand, the broken one was taken out and the pipe plugged up. By this means the other engine could be used, and the lights were turned on at 9 o'clock. It was fortunate that there were no visitors about. Steam and hot water squirted all about the room, and as high as the ceiling. Accidents of this kind are very rare.

The American Electric Manufacturing Company's New Factory.

A photographic view of the new and extensive factory of the American Electric Manufacturing Company is given on this page. This building is in the city of New Haven, Conn., and will be admirably arranged for its purpose, the chief part of the heavy work will be conducted on the first floor. All the work of the American Company will be done in New Haven, as soon as the new factory can be completed.



New Haven Electric Light Factory of the American Company.

Not the Gas Man's Season.

This is the season of the year that gas men have the least use for. The cause of it is that it is also the season when other people have the least use for gas. June, July and August are poor months for a gas company. The nights are short and too warm to light any more jets than are absolutely necessary. The family sit out on the verandah, if they have one, while the gas burns low or not at all in the parlor. Young folks are always very economical in the matter of gas. In the summer they turn it down so that it will not draw bugs and mosquitoes. Then there are a great many consumers who go out of town in the hot months. That cuts down the revenue, for the meters have learned that they might as well lay up while the family is away from home. The great indignant public will not any more settle a gas bill that is figured out by the lightning and truthful calculator down in the cellar. Then the theater and the public halls are not lighted up nearly every night in the week, as they are in the winter.

The least gas is used in July, and the most in January It is just the reverse with ice In September, when the folks begin to come home, the revenue from gas begins to increase. More gas stoves, as well as gas jets, are put into service. Gas is wonderfully deceptive in its lighting power, and few consumers notice the flame, except on rare occasions; and they could not guess anywhere near the difference in candle-power between good gas and bad gas.

The electric light companies are also affected by the hot weather. The city has to be lighted as usual, but the lights do not burn so long. Stores close earlier in summer than in winter, and a good many lights are shut off at 7 o'clock that in cooler months burn until 10 o'clock. As the cost of the incandescent system of electric lighting is reduced, there will be a great change in the method of lighting buildings of all kinds.

Water Power for Electrical Purposes.

On the border of Lake Geneva, Switzerland, a stock company has been formed for the purpose of utilizing the water-power of Montreux for the following purposes:

1. The electric lighting of the Vevey-Montreux district.
2. The electric railway of Vevey-Montreux-Chillon (12 kilometers).
3. To furnish power for domestic or mechanical purposes.

The company has obtained patents for its purposes of the Communes of Chatelard, Vevey, La Tour, and Corsier, supreme control of the power referred to, and concessions for electric lighting, both public and private, throughout the above district for a period of 50 years.

The price of lighting authorized by the concession is limited to a maximum of 3½ centimes, about ⅔ of a cent per hour for a 14 candle-power lamp. The company propose building a line of tramways along the Vaudoin bank of Lake Leman, from Vevey to Chillon, through a district comprising 20,000 residents, besides tourists who often remain the entire season.

Digest of U. S. Patents on Storage Batteries.

REFERENCES TO FOREIGN PATENTS OBTAINED THEREON.

(EIGHTH PAPER.)

1884.

295,889. Mar. 25, 1884. Filed Oct. 30, 1883.
E. T. Starr, Philadelphia, Pa.

A rectangular flanged metal frame is employed within which are arranged horizontally round wires of lead, three or four deep, as may be required, their ends of the wires are "burned" to the metal frame. The wires may be braided or twisted together.

296,164. April 1, 1884. Filed Dec. 29, 1883.
Alfred Haid, Rahway, N. J.

The electrodes consist of hollow leaden wires or lead tubes surrounding a fibrous body—braided parallel or otherwise arranged. Claims fibrous material and leaden covering and process of manufacture.

296,331. April 8, 1884. Filed March 7, 1883.
C. G. Gumpel, England.

English patent, No. 2,756, June 12, 1882.

French patent, No. 152,525, Dec. 8, 1882.

Relates to a portable battery comprising a frame and a number of horizontal dishes of non-conducting material arranged one above the other. Each dish forms a separate cell, within which is placed two metallic plates which serve as the electrodes. The separate cells, may be connected together.

296,849. April 15, 1884. Filed Jan. 28, 1883.
Wm. Lachlan, England.

Refers to terminals for electrodes and consist in providing a thickened lug on the upper end of the electrode and having a screw threaded pin or stud embedded in the lug—may be cast in.

297,457. April 22, 1884. Filed July 21, 1883.
W. A. Shaw, Pittsburgh, Penn.

The patent describes a method of rough-

ing the surfaces of the metal used in making the electrodes prior to their insertion in the battery, consisting in treating the metal to a bath of nitric, acetic, hydrochloric or other acid, or saturated solution of nitrate of soda or potash—may be used—the corrosion being aided, if desired, by electricity preparatory to placing such elements in the electrolytic liquid.

Division of application filed April 14, 1882.

298,348. May 13, 1884. Filed Nov. 13, 1883.
W. E. Case, Auburn, N. Y.

Claims an element or electrode composed of an amalgam with mercury, of any lead alloy, containing a non-oxidizable metal, and having a lower fusing point than lead alone, any substance capable of storing electrical potential, and any inert substance capable of occluding gases—also process of uniting the materials.

299 177. May 27, 1884. Filed June 19, 1883.
W. Stanley, Jr., Englewood, N. J.

The electrodes are composed of a mixture of ground white lead and common salt made to a paste with salt water, and poured into a mould of the required shape.

If desired, the mixture may be poured around a thin, perforated lead plate. The mixture is dried, to evaporate the water, and is then treated by immersing the plates in a bath of salt water, acidulated with hydrochloric acid, and passing a current of electricity, by means of which the carbonate of lead on the positive electrode is converted into peroxide of lead, and that on the negative electrode hydrogenized lead.

The plates of carbonate of lead, mixed with salt or salt omitted, may be immersed in a solution of chloride of lime, and allowed to remain till converted into peroxide of lead.

A negative electrode is also described made from a plate of lead, upon which a deposit of flaky lead is formed and placed between two plates of zinc.

The electrolyte employed is the usual solution.

299,178. May 27, 1884. Filed Aug. 22, 1883.
W. Stanley, Jr., Englewood, N. J.

An electrode consisting primarily of tubes or hollow scraps of lead, pressed together to form a plate.

No. 267,860. Nov. 21, 1882.
No. 274,292. March 20, 1882.

299,434. May 27, 1884. Filed Sept. 8, 1873.
Eli T. Starr, Philadelphia, Pa,

Consists of combining a series of storage b with a pipe and reservoir system, whereby fresh electrolytic liquid may be fed to batteries, or the contained fluid drawn therefrom or equalized; also to the means for carrying off the gases evolved in the process of charging the batteries.

300,052. June 10, 1884. Filed Jan. 14, 1884.
Aug. G. Davies, Baltimore, Md.

Leaden electrodes are provided with upwardly projecting lugs for terminals, and means for connecting them together.

300,933. June 24, 1884. Filed July 18, 1883.
English patent, No. 3,532. July 25, 1882.
French patent, No. 153,313. Jan. 25, 1883.
Belgic patent, No. 60,276. Jan. 27, 1883.
George L. Winch, Madras, East Indies.

Relates to electrodes made from metallic plates (as lead, copper or zinc), covered on their faces by shells of cork or pitch.

Also to an electrolytic liquid consisting of an aqueous solution of the salts of aluminum, with sulphate of copper.

Various other salts may be employed in place of the aluminum, such as potash, ammonia, etc.

Connecting Dynamo and Engine.

A very good method of connecting the dynamo to the engine direct is shown on this page. The engine is one manufactured by the New York Safety Steam Power Co., coupled with an Edison dynamo. This arrangement is successfully used in many cases, and is popular in electric lighting circles, when the arrangements of the station make it practicable.

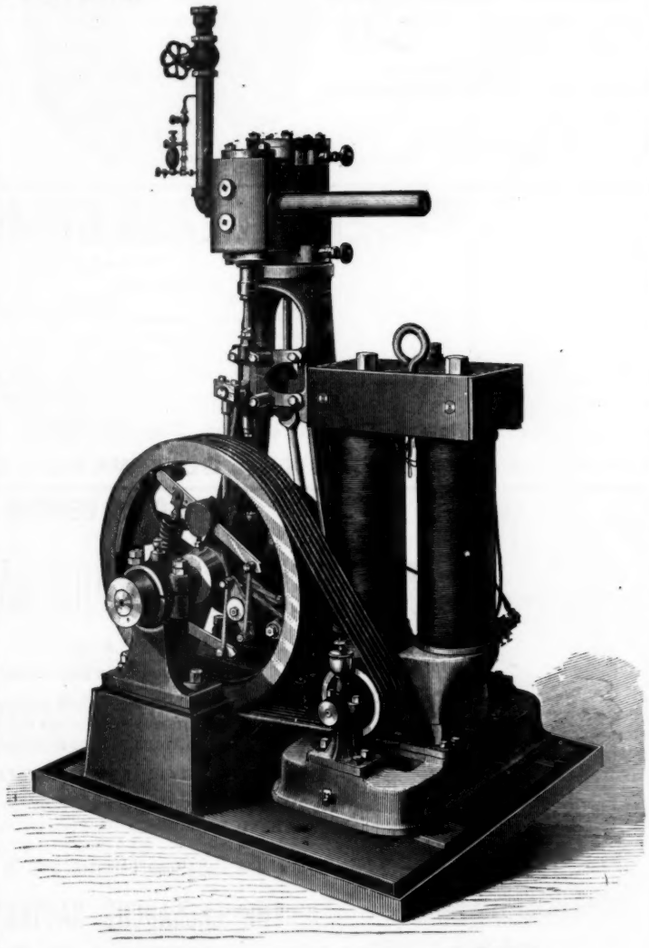
—— The REVIEW office has received a couple of sheets of samples of the various styles of insulated wires manufactured by Holmes, Booth & Haydens. The samples consist of telephone, telegraph and electric light wires, neatly arranged and presenting an excellent picture in miniature of the fine work turned out by this company.

—— In a paper lately read before a London engineering society, it was mentioned as the result of many experiments that 1,000 feet of gas used to produce incandescent electric lighting by means of a gas engine would give twice as much light as it would if employed as an illuminant in the ordinary way.

—— The Electrical Supply Company, of 17 Dey street, New York, has just issued a large and complete illustrated catalogue of their electrical goods. There are over 160 pages in the prettily gotten-up work, and, in addition to the presentation of the many goods manufactured by this company, several valuable tables, directions concerning batteries, etc., are published.

—— At a recent opening of the bids in New Orleans for lighting the markets, public buildings and squares, the bid of the Brush Company was $14,000, and of Louisiana Electric Light Company $15 979.99. The award was not made at that time.

—— The Stamford (Conn.) Electric Light Company, owning and operating the Schuyler system, already successfully established, was fully organized at a meeting held on Tuesday evening last, with the following board of officers: President, W. W. Skiddy; vice-president, Samuel Fessenden; treasurer, J. D. Smith; secretary, A. G. Weed. The directors are Chas. E. Dustin, Esq., of Hartford, and Messrs. Skiddy, Fessenden, Smith, Weed and A. W. Williams, of Stamford. The company are already running 69 arc lamps—49 for private patrons and 20 for the borough. Mr. J. K. Butler has been engaged as general manager in charge of the practical operation of the system. This is a good selection, as Mr. Butler is a gentleman experienced in electrical matters, having controlled the telephone interests in his city for a number of years.



CONVENIENT ARRANGEMENT OF DYNAMO AND ENGINE.

—— The Augusta (Ga.) Electric Light Company has been formed, with George R. Lombard, president; Chas. E. Coffin, treasurer; John M. Graham, secretary; J. T. E. Thornhill, superintendent. Directors—Geo. R. Lombard, Chas. E. Coffin, Job A. A. W. Clark, John M. Graham, J. T. E. Thornhill, of Augusta, and Edwards H. Goff, of New York. The capital stock was increased, and arrangements made for a large extension of the business, by the addition of a new engine and boiler, and electrical apparatus of the latest and most approved make sufficient to bring the plant up to a capacity of one hundred and fifty arc lights of 2,000 candle-power each. The company is also the exclusive owner for the State of Georgia of the Sawyer-Man patent rights for incandescent lighting, embracing the most important features of several systems. Superintendent Thornhill has left for the North on business of the company.

—— Workmen are now engaged in fitting up the old stone building on the bank of the river at the edge of the upper falls for occupancy by the Rochester Electric Light Works. The interior will be entirely renovated. D. W. Knight has charge of the work of sinking a shaft for a turbine wheel. The shaft will be thirty feet square and ninety-three feet deep.

—— A despatch from London says: "A heavy electric disturbance is prognosticated for England in the near future. The makers of incandescent electric lamps are combining for the purpose of opposing the attempt of the Edison Swan Company of the United States to secure a monopoly of the manufacture. A committee has been appointed to take the matter actively in hand, and a common fund started to defend the actions which it is intended to bring and appeal them if necesary to the highest courts. A lively time is looked for."

ELECTRIC LIGHT NEWS

—— The Zanesville, Ohio, Electric Light Company has been organized with a capital stock of $25,000.

—— Lockland, Ohio, has the lighting fever bad, two electric companies being engaged in putting in plants.

—— The city hall, Pittsburgh, is to be lighted by electricity, and the work of placing the wires is now in progress.

—— On Monday the new grounds of the St. Mary's Roman Catholic School Association in Newark, N. J., were formally opened, the grounds being handsomely illuminated by the electric light.

—— A meeting of the stockholders of the Municipal Electric Light Company, of Brooklyn, will be held September 7th for the purpose of increasing the capital stock of the company from $250,000 to $500,000.

—— An examination, by an oculist, of the eyes of 1,100 persons who work by the incandescent electric light, fails to show any injurious effects produced by that light. The arc light may cause eye trouble if in too close proximity.

—— The name of the "Boulton Standard Carbon Company," of Cleveland, Ohio, has been changed to the "Boulton Carbon Company." Mr. W. H. Boulton, whose name has so long been identified with the carbon business, is general manager of this company.

—— The Marlboro Schuyler Electric Light Company have added thirty-five of the new distribution boxes of the Schuyler Company to their outfit. These new boxes are giving great satisfaction to the customers, and are being universally adodpted in the Schuyler stations.

—— The new factory of the Electrical Accumulator Company is rapidly approaching completion in the city of Newark. The factory is the only one of the kind ever constructed in this country. This is the company of which Mr. T. N. Vail is president, and in which several well-known telephone men are actively interested.

—— There is not the most pleasant feeling existing between the two electric lighting companies of Elmira, N. Y., one of which operates the Thomson Houston system the other the United States. The latter company, to secure its right of way, is nailing extensions on the top of its poles, which prevent the Thomson-Houston people from getting in, the United States Company claiming this is necessary as it expects to put up longer poles soon. The local press is clamoring to have all the poles taken down.

—— A railroad man expressed the opinion recently that it would not be long before passenger coaches will be lighted with electric lamps. As soon as the electric headlight for locomotives shall have been made a success, which he was confident it eventually would be, the system could be easily extended throughout the entire train, thus doing away with the smoky, ill-smelling lamps, which are one of the positive discomforts of railroad travel under the present system. Electric lamps would be peculiarly suited for the lighting of railway carriages, and a long-suffering public will hope that their advent may be near at hand.

—— Superintendent W. L. Bonnel, of the Elizabeth Electric Light Company, announces a discovery made and applied that kills the inductive influence of the electric light current on the telephones in that city. Since this discovery President H. W. Pope, of the electric light company, has been granted the privilege of running his wires on the certain poles owned and used by the telephone company There is a city in Ohio known as Youngstown, where this discovery of Superintendent Bonnell's should be in use, for it is there that the electric light company has been enjoined on account of its electric current interfering with the telephones.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING AUG. 24, 1886.

347,766 Artificial electrical resistance; Harold P. Brown and Francis H. Brown, Chicago, Ill.

347,767 Incandescent electric light hanger; Harold P. Brown, Chicago, Ill.

347,768 Means for storing and utilizing electricity on vehicles; Charles E. Buell, New Haven, Conn.

347,823 Electric pile; Jean Baptiste Heyraud, Lyons, France.

347,830 Street support for electric lamps; James J. Renehan, New Britain, Conn.

347,866 Thermo-electric damper regulator and alarm; Albert M. Butz, Minneapolis, Minn.

347,901 Electric railway traveler and switch operator; Charles J. Van Depoele, Chicago, Ill.

347,902 Electro-dynamic motor; Charles J. Van Depoele, Chicago, Ill.

347,903 Regulator for electric motors; Charles J. Van Depoele, Chicago, Ill.

347,904 Dynamo-electric railway brake; Charles J. Van Depoele, Chicago, Ill.

347,905 Underground conduit for electric railways; Charles J. Van Depoele, Chicago, Ill.

347,924 Telephone transmitter; John E. Dann and John Sapp, Honeoye Falls, N. Y.

347,937 Regulator for dynamo-electric machines; Rudolph M. Hunter, Philadelphia, Pa.

347,943 Insulator for electric wires; John M. Leonardson, Ludington, Mich.

347,964 Regulator for electric motors; Oliver B. Shallenberger, Rochester, Pa.

348,008 Conductor for electric railways; Robert L. Harris, Brooklyn, N. Y.

348,045 Electrical annunciator; Gwynne E. Painter, Baltimore, Md.

348,048 Fusible cut-out for electric circuits; Chas. G. Perkins, New York, assignor to the Imperial Electric Light Co., same place.

348,049 Fusible cut-out for incandescent electric lamps; Chas. G. Perkins, New York, assignor to Imperial Electric Light Co., same place.

348,077 Telephone; Thomas A. Watson, Everett, Mass., assignor to the American Bell Telephone Co., Boston, Mass.

348,114 Electrode for telephone transmitters; Thomas A. Edison, Menlo Park, N. J.

348,125 Night lamp for electric lighting systems; John W. Howell, New Brunswick, N. J.

348,134 Receiving telephone; Orazio Lingo, New York, N. Y.

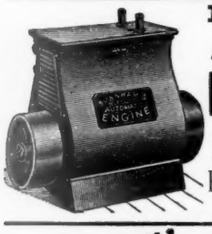
348,139 Telephone switch and circuit; Edwin Pope, Quebec, Quebec-Canada.

348,155 Night lamp for electric lighting systems; Richard N. Dyer, New York.

Parties Intending to purchase Electric Lighting Machinery, should consult

W. N. GRAY, Electrical Engineer,
CARLISLE BUILDING, CINCINNATI, O.

FOWLER & FOWLER,
PATENTS AND PATENT CAUSES.
NEW YORK, Temple Court, and WASHINGTON, Pacific Building,
ELECTRICAL INVENTIONS.
A. C. FOWLER, C.E., was Examiner in the U. S. Patent Office from 1880 to 1886, in the Interference and Electrical Divisions.



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SELF-OILING
Automatic Steam
Engine
Patented Feb. 23, 1886.
Catalogue sent free by
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YORK, PA.

MITCHELL, VANCE & CO.,
GAS FIXTURE MANUFACTURERS,
Have added a department for the Manufacture of Electroliers and other fixtures adaptable to any system of Incandescent Electric Lighting, also Combination Fixtures for both Gas and Electric Light. Estimates and designs furnished upon application.
836 & 838 BROADWAY,
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Galvanometers, Resistance Coils, Condensers, Keys, Switches, &c., Bailey Combination Set, Pratt's Speed Indicator, &c.
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Manufacturer of and Dealer in
TELEGRAPH & ELECTRICAL INSTRUMENTS
House and Hotel Annunciators, Line and Office Wire, Fine Instruments for Electric Testing, etc., at the old stand of
CHARLES WILLIAMS, JR.,
109 & 115 COURT ST., BOSTON, MASS.

VALLEE & BRO.
Wholesale and Retail Dealers in
ELECTRICAL SUPPLIES,
Annunciators, Burglar Alarms, Electric Bells, Batteries, Wire, Etc.
1210 MARKET ST., - Philadelphia, Pa.
SEND FOR CATALOGUE.

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Of all the different Companies
BOUGHT AND SOLD ON COMMISSION,
ALSO
Chicago Local Stock and Bonds.
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146 La Salle Street, Chicago.

Detroit Electrical Works
MANUFACTURERS OF
ELECTRIC SUPPLIES,
INCLUDING
Medical Batteries, Skeleton and Box Bells, Burglar Alarms, House Annunciators, Fire Alarm Boxes, Pins, and Brackets,
INSULATED MAGNET, TELEPHONE AND ELECTRIC LIGHT WIRE.
GENERAL OFFICES and FACTORY:
DETROIT, MICHIGAN.

THE
Solar Carbon & Mfg. Co.
(WORKS NEAR PITTSBURGH, PA.)
The only Carbon made from Natural Gas. Our works are thoroughly equipped with Modern Machinery, and we guarantee the longest life, greatest brilliancy without hissing.
GENERAL EASTERN OFFICE,
55 South Third Street,
Philadelphia, Pa.

Fig.259

PHOENIX GLASS COMPANY,
(Works, Water Cure, Beaver County, Penn.)

Fig.255

——MANUFACTURERS OF——
A FULL LINE OF ELECTRIC LIGHT GLOBES & SHADES,
BOTH ARC AND INCANDESCENT,
In Opal, Flint and Art Glass Effects, in Opalescent and other Colors,

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GENUINE DISQUE CELL, COMPLETE.
The Porous Cell also bears Label.

THE ONLY GENUINE
LECLANCHÉ DISQUE BATTERY
IS THAT MADE BY
THE LECLANCHÉ BATTERY COMPANY.
Every Jar and Porous Cell bears the label and trade mark as shown in the cut.
All others are imitations.
DO NOT BE IMPOSED UPON.
IF DEALERS HAVE NOT THE GENUINE BATTERY. SEND DIRECT TO US FOR PRICE LIST.
None of the Imitations Compare with it in Efficiency.
THE LECLANCHÉ BATTERY CO.
149 W. 18th St., New York.

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Standard ✣ Electrical ✣ Works,
MANUFACTURERS OF
TELEGRAPH AND TELEPHONE APPARATUS,
Hotel and House Annunciators, Burglar Alarms,
CALL BELLS, "POST'S" MAGNETO BELLS,
PINS and BRACKETS, BATTERIES, &c., &c.
IN STOCK:—FULL LINE
IRON, STEEL and HARD-DRAWN COPPER WIRE, Delivered at Lowest Prices.
☞ ESTIMATES FURNISHED. SEND FOR CATALOGUES AND PRICES. ☜
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WOBURN, MASS.

MANUFACTURERS OF THE

BEST SYSTEM OF

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ON ARC LIGHT CIRCUITS,

Possessing a Flexibility Equal to Low Tension Distribution.

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ONLY SYSTEM OF REGULATION OF CLOCKS FROM A DISTANT POINT IN EXISTENCE.

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Can be used upon telephone, district telegraph, railroad and private lines without interference with usual business. Patented devices on small frame, ready to screw into any clock case, furnished at the Company's expense, and a small annual royalty charged for those actually in use.

Little capital required, Most profitable investment of the day.

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PLATINUM,

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Platinum in sheet and wire, all sizes, and any degree of hardness. Scrap and native platinum purchased.

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CLEVELAND, OHIO.

TRADE MARK. W. H. B.

TRADE MARK. W. H. B.

We have decided to change the name of our firm from the "BOULTON STANDARD CARBON COMPANY to the "BOULTON CARBON COMPANY." Mr. W. H BOULTON, our General Manager, having built up a world-wide reputation for the MANUFACTURE OF GOOD CARBONS under the name of the BOULTON CARBON COMPANY, is desirous of taking his old name and keeping it AT THE HEAD OF THE CARBON BUSINESS, where it always has been under his management. The Carbons he has made since he started two months ago (under the name of the BOULTON STANDARD CARBON COMPANY), have been ACKNOWLEDGED BY ALL WHO HAVE TRIED THEM TO BE THE BEST THEY HAVE USED. To PROTECT OURSELVES and our patrons FROM IMPOSITION we have adopted the above trade-mark, which will be stamped on the ends of our moulded carbons and on all boxes. This trade-mark is registered and we will guarantee all goods sent out by us under it. We manufacture Carbons suitable for all the different systems of lighting.

TRADE MARK. W. H. B.

TRADE MARK. W. H. B.

Boulton Carbon Company,

W. H. BOULTON, General Manager.

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P. H. WOODWARD, Sec. and Treas. N. T. PULSIFER, Gen'l Manager.
THOMAS PRAY, Jr., Gen'l Supt.

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TRANSMISSION OF POWER.

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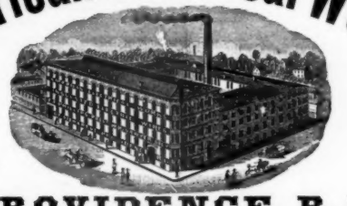
American Electrical Works



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TELEPHONE & INCANDESCENT CORDS.

ELECTRIC LIGHT WIRE

MAGNET WIRE, PATENT RUBBER-COVERED WIRE,
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By the use of our Electric Valve Service, the heating of buildings to a uniform temperature is accomplished. Rooms may be kept at any temperature desired, thereby saving fuel, discomfort, ill health, the cracking of wood-work, furniture and pictures, and the danger of fire by over heating.

This apparatus applies equally well to all forms of heating and ventilating devices, the thermometer in the room automatically governing the temperature. It is invaluable in Public Buildings, Private Residences, Business offices, Hospitals, Churches, Schools, Conservatories, Factories, etc.

SEND FOR CIRCULAR "R."

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NEW YORK, 686 Broadway. CHICAGO, 195 Wabash Avenue. BOSTON, 611 Washington street.

THE

American Bell Telephone Company,

95 MILK ST., BOSTON, MASS.

This Company owns the Letters Patent granted to Alexander Graham Bell, March 7th, 1876, No. 174,465, and January 30, 1877, No. 186,787.

The Transmission of Speech by all known forms of ELECTRIC SPEAKING TELEPHONES infringes the right secured to this Company by the above patents, and renders each individual user of telephones, not furnished by it or its licensees, responsible for such unlawful use, and all the consequences thereof and liable to suit therefor.

Hess Guest Call AND Fire Alarm

COMBINED WITH THE

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PLANKINTON HOUSE, 440 Rooms, Milwaukee, Wis.
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KIRKWOOD HOUSE, 150 Rooms, Des Moins, Ia.
GORHAM HOUSE, 150 Rooms, Lincoln, Neb.
HOTEL RICHELIEU, 128 Rooms, Chicago, Ill.
EXCHANGE HOTEL, 114 Rooms, Montgomery, Ala.
HOTEL BUCHTEL, 100 Rooms, Akron, O.
ST. CLOUD HOTEL, 100 Rooms, Canton, O.
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Also a large number of Hotels throughout Texas, Southern California, Missouri, Colorado, Pennsylvania, New York and Minnesota.

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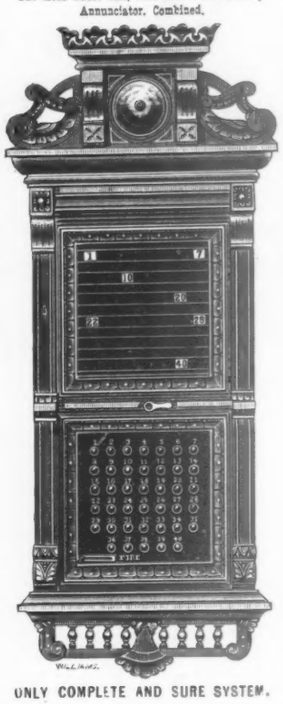

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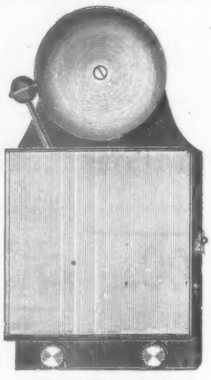

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Hess Double Contact Push Button.

GRAVITY DROP ANNUNCIATOR, ONLY.

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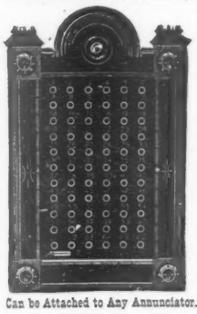

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Five years' practical experience in the installation of these well-known systems of Arc and Incandescent Electric Lighting, enables the Company to give the most perfect, reliable and economical Electric Lighting known.

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Equitable Building,
New York Ferry Co.,
Tribune Building,
U. S. Custom House.
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Delmonico's,
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Lotus Club,
Union Club,
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Theodore Stewart,
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Estimates made by Experts at short notice, on application at the office of the Company.

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Special Tools and Dies. Model and Experimental Work a specialty.

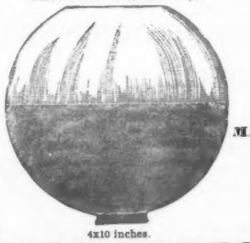
Nos. 53 and 55 North Seventh Street, Philadelphia.

A PERFECT ELECTRIC LIGHT GLOBE.

THE UNION GLASS COMPANY,

BOSTON, MASS., U. S. A.,

HALF GROUND (Horizontally).



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FOR OPEN CIRCUIT WORK.

No liquid. Send out charged, ready for use. Will do as much work as any other open circuit battery.

PRICE, $1.50 EACH. VEST POCKET SIZE, 50c. each by mail.

EDISON LAMPS, BATTERIES, ETC.

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Authorized agents for Edison Lamp Co.

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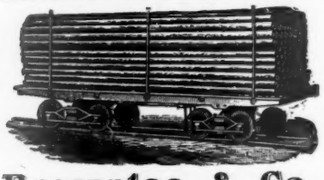
NEW PAT'D. ELECTRIC LAVA GAS TIP.

The Cheapest Burner in the Market For Multiple Lighting.

Send for prices to

A. T. SMITH,
6 West 14th St., New York.



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BROWNLEE'S CONCAVED BRACKET.

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Zincs, Leclanche Zincs,

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GRAVITY BATTERY ZINCS,
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MADE FROM PURE SPELTER.

WOOD AND BRONZE PUSH BUTTONS,
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Owning and Operating the

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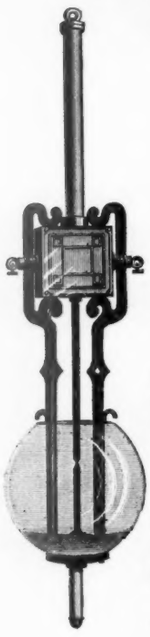

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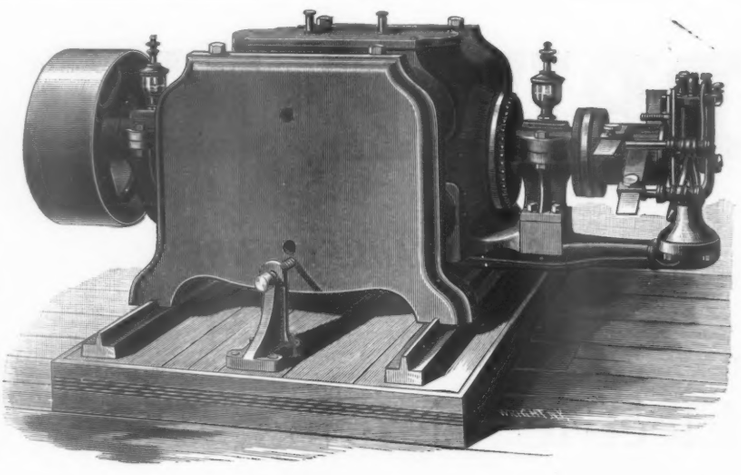

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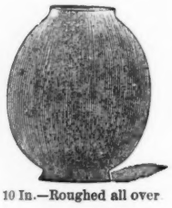
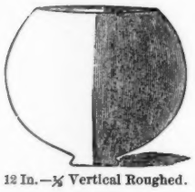


10 In.—Roughed all over

10 In.—Opal.

9 In.—⅓ Horizontal Roughed.



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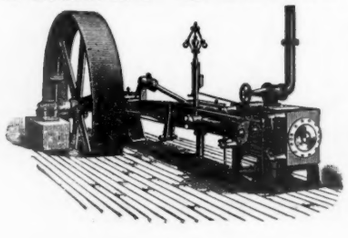

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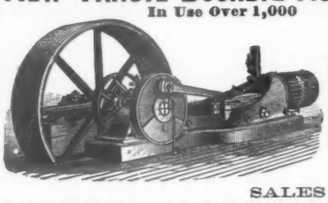

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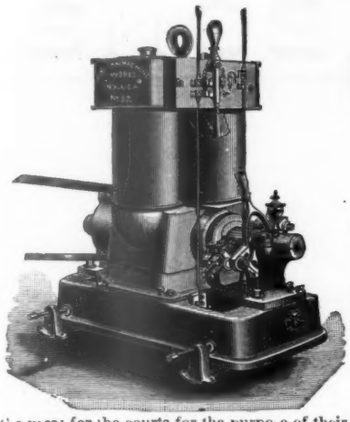

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The Incandescent Electric Lamp is the universally acknowledged invention of Thomas Alva Edison, and is covered by fundamental patents granted to him January 27, 1880, No. 223,898; May 4, 1880, No. 227,229; and July 20, 1880, No. 230,255.

These patents, as well as some 300 additional detail and system patents, are all owned by this company.

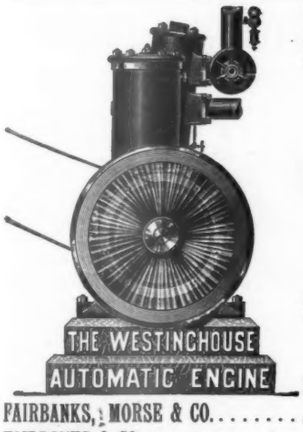
All forms of incandescent lamps as well as a great majority of the 'Detail" and "System" devices offered by others than this company and its licensees, infringe the above mentioned patents, and all persons using them render themselves individually responsible for such unlawful use, and all the consequences thereof, and liable to suit therefor.

A CARD TO THE PUBLIC.

The Edison Electric Light Company having instituted suits on its patents, must decline to substitute the advertising columns of the press for the courts for the purpose of their legal interpretation. Mr. Edison's carbon filament patent of 1879 covers broadly the modern incandescent lamp. The claim that this patent has ever been in litigation in the United States Patent Office is absolutely false. In Germany and England, this fundamental patent has finally prevailed against all infringers thus establishing the fact that Mr. Edison's great invention has been nowhere anticipated; *Ergo*, a like result must follow in the United States. The straining and distorting of these facts, together with the violent effort to interweave with them certain minor and IRRELEVANT CASES for the purpose of fraudulently posing before the public as joint heirs with Mr. Edison in the fruits of these patent decisions, only indicate the DIRE EXTREMITY of those who are thus gradually becoming ENVIRONED by due process of law.

THE EDISON ELECTRIC LIGHT COMPANY

By EDWARD H. JOHNSON, Vice-President.



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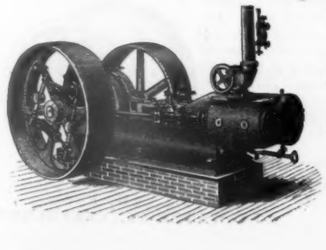

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1st.—The outer circuit was cut out at its terminals, making the dynamo in complete short circuit, and all depending upon the Regulator to save the machine from immediate destruction. The dynamo was started, and after running twenty minutes, without once flashing at commutator or the least sign of disturbance, the machine was stopped and the armature found to be lukewarm and the fields cold.

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The above are only a few of the tests, and from our positive knowledge of the Regulator WE CLAIM IT SUPERIOR to all others, and by its use the destruction of the machine is impossible.

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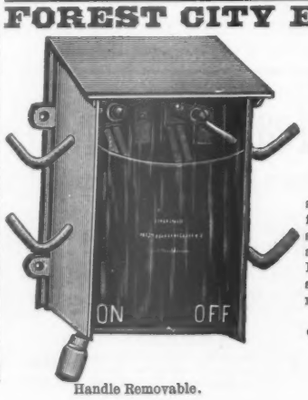

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This system of Electric Lighting is the development of a series of inventions and discoveries of JAMES J. WOOD, Electrician of the American Electric Manufacturing Company, of New York, who has devoted himself to the discovery of methods by which A PERFECT SYSTEM OF ARC LIGHTING, WITH PERFECT AUTOMATIC REGULATION could be obtained.

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The Wood Automatic Regulator is the ONLY ONE made which will permit the turning off of all the lights in circuit and allow the dynamo to run any length of time on a short circuit, or any number of lamps—from ONE upward—on any size or capacity of machine without injury to the machine, and with corresponding diminution of power.

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The above are bold statements, but they are made deliberately, and we are ready to substantiate them in every particular.

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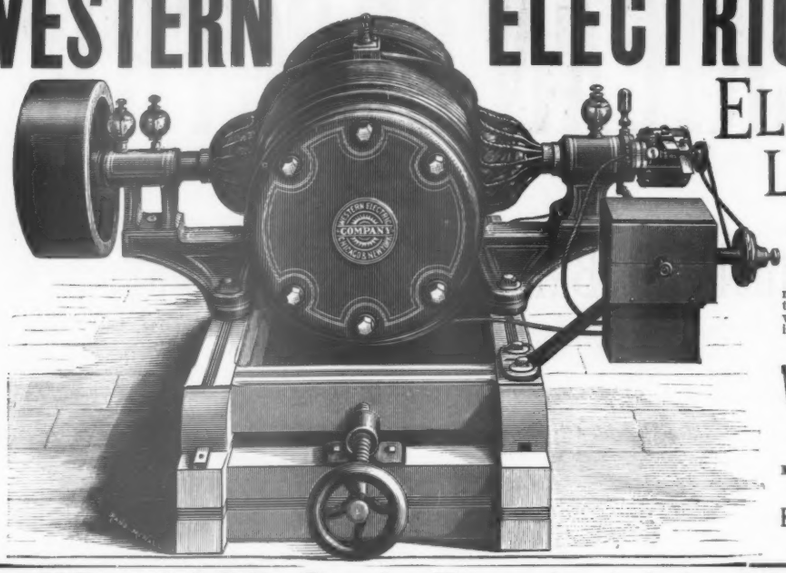

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Brady Electric Light Mast Arm.

H. M. LINNELL, Selling Agent, Hartford, Conn.

T. H. BRADY, Patentee and Sole Manufacturer
NEW BRITAIN, CONN.

NEW YORK, *January* 5, 1886.

T. H. BRADY, Esq., New Britain, Connecticut,
Dear Sir—I am much pleased with your Mast Arms for arc lamps. They are simple in construction, low in price, and perfectly adapted for all purposes where projecting lamps are required. Yours truly,
THE BRUSH-SWAN ELECTRIC LIGHT CO. OF NEW ENGLAND,
J. B. POWELL, *General Manager*.

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Respectfully,
MUNICIPAL ELECTRIC LIGHT CO.,
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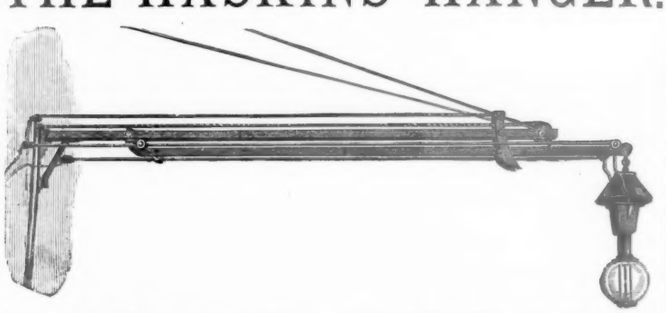

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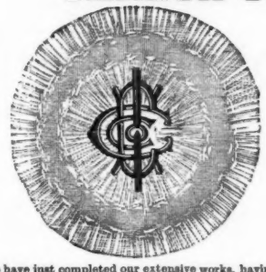

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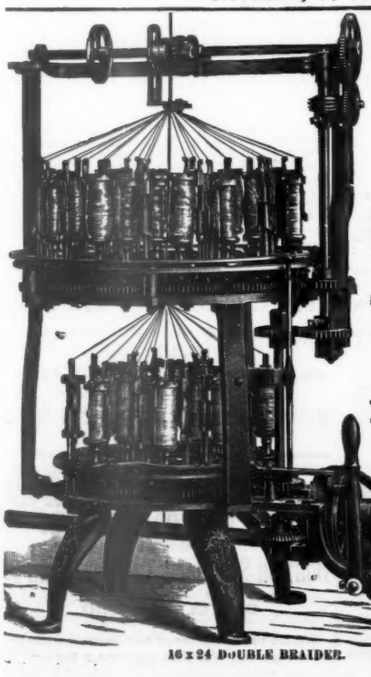

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